IROQUOIS ARITHMETICS

BOOK TWO

DeGroat
Firman
Smith

Iroquois Publishing Company

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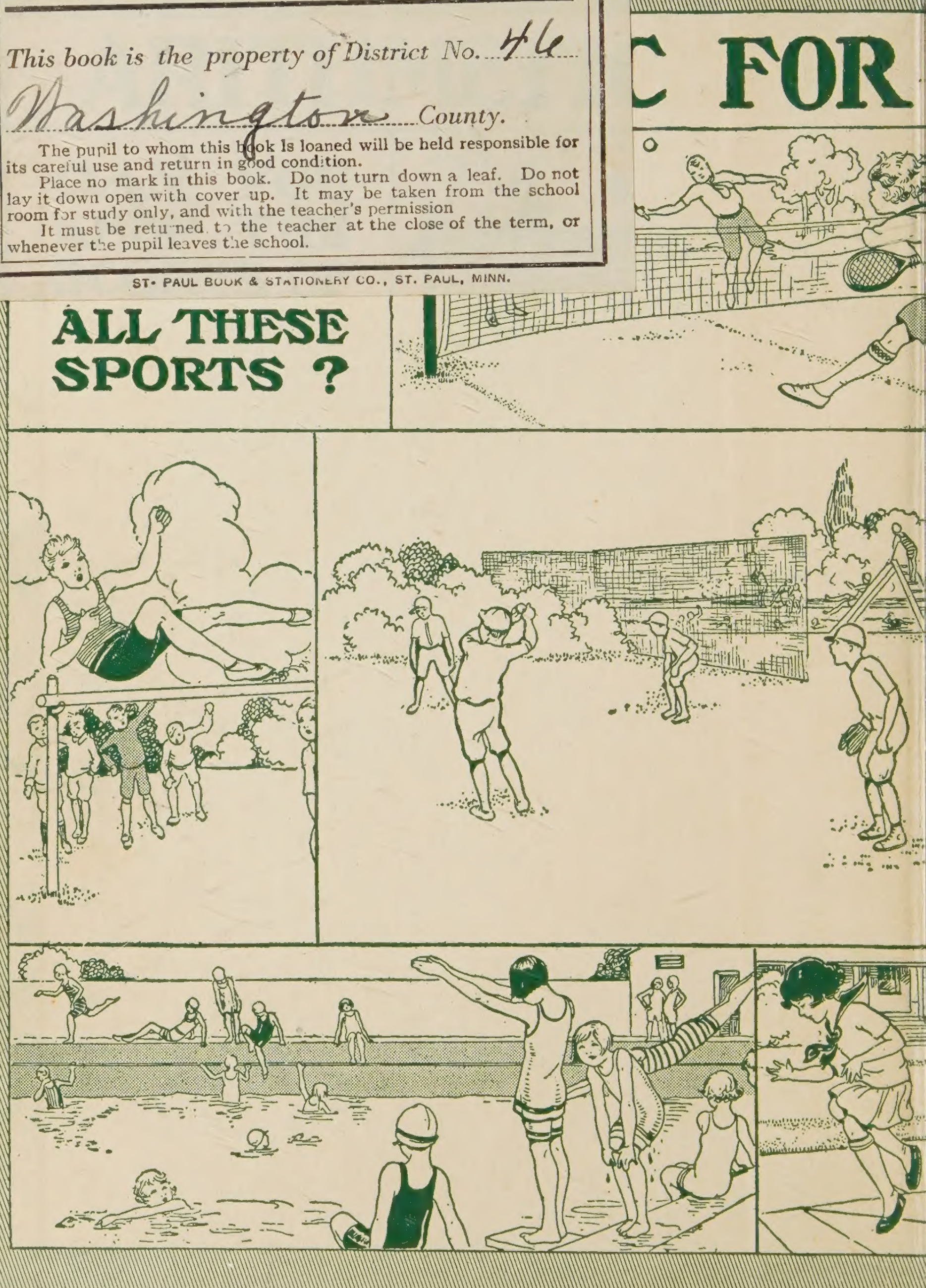

EVERY SPORT

THE

IROQUOIS ARITHMETICS

FOR SCHOOL AND LIFE

BOOK TWO

GRADES FIVE AND SIX

BY

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PRINCIPAL OF THE STATE NORMAL SCHOOL
CORTLAND, NEW YORK

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IROQUOIS PUBLISHING COMPANY, Inc.
SYRACUSE, N. Y.

THE IROQUOIS ARITHMETICS

FOR SCHOOL AND LIFE

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TWO BOOK SERIES

ELEMENTARY, Grades Three, Four and Five

Including a review of
Grades One and Two

ADVANCED, Grades Six, Seven and Eight

THREE BOOK SERIES

BOOK ONE, Grades Three and Four

Including a review of
Grades One and Two

BOOK TWO, Grades Five and Six

BOOK THREE, Grades Seven and Eight

SERIES BY GRADES

Grade Three

Including a review of
Grades One and Two

Grade Four

Grade Five

Grade Six

Grade Seven

Grade Eight

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Syracuse, New York

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To Teachers of Arithmetic:

The Iroquois Arithmetics represent a distinct advance in arithmetic textbook achievement. They bring to pupil and teacher not only the experience of successful arithmetic teachers but also the results of modern researches and surveys. These investigations are demonstrating scientifically where the real difficulties lie and how to meet them. Three noteworthy investigations have been constantly before the authors:

1. Number Combinations, Their Relative Difficulty and the Frequency of their Appearance in Textbooks, by Frank L. Clapp, Bureau of Educational Research, University of Wisconsin.

2. The Third and Fourth Yearbooks of the Department of Superintendence of the National Education Association.

3. Summary of Educational Investigations Relating to Arithmetic, by Guy Thomas Buswell and Charles Hubbard Judd.

The University of Wisconsin investigation clearly points out the relative difficulty of all number combinations and how arithmetic texts in the future should emphasize them. Utilizing these facts, the authors give the pupils drill in proportion to the relative difficulty of the 390 number combinations in addition, subtraction, multiplication and division. In a similar manner the results of the other recognized investigations are utilized.

Furthermore, the authors have carefully considered the latest and most generally accepted courses of study in the subject, including the New York State course of study, those for Baltimore County, Baltimore City and

Minneapolis, as well as all State courses of study in arithmetic that have recently been issued, in order that this series might meet nationwide and present day demands.

In the Fourth Year Book of the Department of Superintendence it says:

"Modern psychology demands that in the teaching of arithmetic there should be, on the part of the child, a real feeling of need and clear vision of use and application,—in short, there should be as complete motivation as possible." The Iroquois Arithmetics have been built to meet this demand.

BOOK TWO

Book Two is for grades 5 and 6. Like Book One it is a complete self-explanatory text for children. **No teacher's manual is needed.**

Language.

The language of Book Two, both in vocabulary and sentence structure, is slightly easier than standard reading material for the Fifth and Sixth Grades. Children are able to read material that they do not thoroughly understand; and, since scientific research has determined that from 30% to 50% of the errors in problem solving are due to the inability of the pupils to understand the language of the problems, the authors have carefully avoided bringing any language difficulties into either the process explanations or the problems.

Reviews to Enable Pupils to Retain Skills Already Acquired.

A prominent normal school principal is in the habit of saying, "We know things because we have known them

a great many times." That is only another way of saying that the things that are taught in school will not be retained by the pupils unless they are frequently reviewed. The Iroquois Arithmetics provide systematic reviews so that skills that have been acquired are retained. These reviews are in harmony with recent investigations, which show that the problems met in everyday life are extremely simple. A further aim of the reviews is to secure greater accuracy and speed, with special emphasis on accuracy.

Addition, Subtraction, Multiplication and Division of Whole Numbers and Decimals.

These four processes are thoroughly reviewed at the beginning of each half year after their first presentation. By this plan the pupil has the advantage of frequency of experience with these all important operations which, in more than 85% of the problems of everyday life of the adult, are all that are used.

Drill on the Four Fundamentals.

The varied drills in the four fundamentals have been scientifically built on the researches which have determined the order of difficulty of the 390 combinations in addition, subtraction, multiplication and division.

Long Division.

The treatment of long division in the fifth grade is not merely a review but a new and complete presentation. Each and every one of the steps is taken up in logical order, with plenty of drill and application.

Fractions.

Recent investigations have shown that only simple fractions are used to any great extent in real life. Con-

sequently, the Iroquois Arithmetics, which emphasize the arithmetic of everyday life instead of traditional textbook arithmetic, give the greatest emphasis to these simple fractions.

Many teachers have found fractions the most difficult subject in arithmetic to present. For pupils, fractions have been difficult because of incomplete and faulty process explanation of principles and processes.

In the Iroquois Arithmetics the steps in the teaching of common fractions are carefully graded and developed one at a time. No steps have been omitted. Each process is first introduced through a worthwhile problem, and the general rule for applying the principle is developed from a simple concrete example.

An abundance of application is given to insure knowledge of each principle and accuracy in applying it. This simple inductive method of handling fractions creates child appeal and understanding, a thing which has been much needed in handling this most difficult subject. Nowhere has it been taken for granted that a pupil knows what experience shows that he does not know.

The big problem in securing results in fractions is to make sure that the pupil understands the meaning of fractions and how and when he should use each of the many processes involved. The solution of this problem makes the work in fractions in this book worthy of unusual attention.

Tests.

The frequent and thorough tests are so built and placed throughout the book as to afford both a check on the work just finished and a catchup and review of the subjects previously covered. Moreover, the tests include and

conform to the latest and best in time allowance, self-rating devices, and speed and accuracy standards. They conform to the recommendations in a recent yearbook of the Department of Superintendence, which says, "Time limits are to be generous, placing chief emphasis on accuracy rather than on speed alone. Rating should be in terms of examples done correctly in a given amount of time. Emphasis should be on correction of specific errors." The authors are thoroughly in agreement with these statements, and their standards throughout are in complete harmony with them.

Oral and Written Work.

In general no sharp demarcation is made between oral work and written work. Ample material is available for both but, with the wide differences in capacity and attainments of classes, it is believed best to leave to the teacher the decision as to which shall be oral.

Copying Minimized.

Care has been taken in spacing abstract drill on the page to minimize copying. With a folded answer paper as shown opposite page 1 the pupil works from the printed page and writes only his answers.

The authors wish to express their very great appreciation to the many teachers who through their criticisms and timely suggestions have done so much to perfect these books. They desire especially to acknowledge the many valuable contributions given by Miss M. Elsie Davis, formerly teacher of Arithmetic Methods in the City Training School, Buffalo, New York, and by Miss Ina M. Hayes, Supervisor of Arithmetic in the State Normal School, Cortland, New York.

Iroquois Publishing Company

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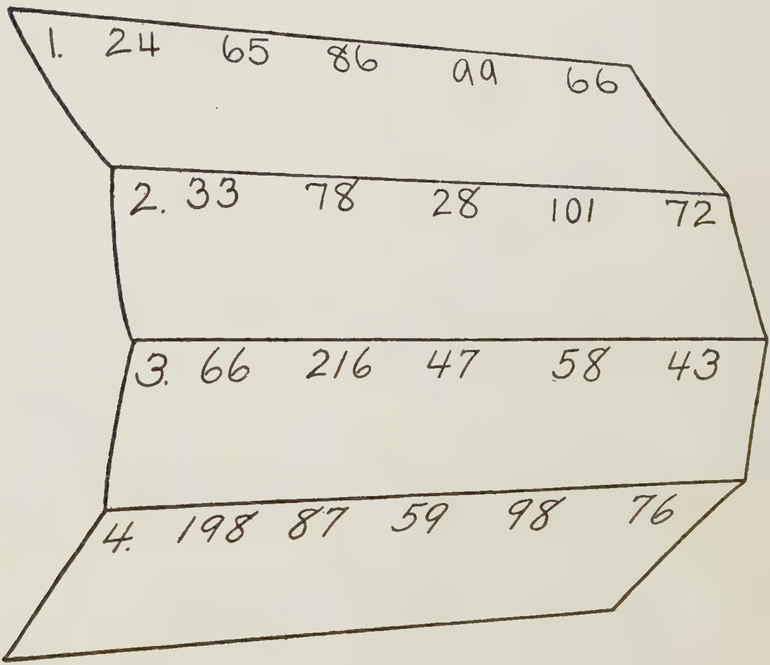
NEVER WRITE IN YOUR BOOK

When your book tells you to do some work without copying, place a piece of paper below the first row of examples and write your answers on it. Then fold these answers down, place the fold below the second row of examples and write their answers. Number each row.

This is the way your paper will look, if you have four rows of answers.



FIFTH GRADE

FIRST HALF

A DAY AT THE FAIR

1. Yesterday my brother George took Polly and me to the Fair. George paid all the bills and then Polly and I each paid him our share. Here is what the trip cost George. How much was each share?

Tickets to the Fair	$1.50	Lunch	$1.05
Getting weighed	.03	Midway tickets	.45

2. At the dairy show, we guessed the weight of a cheese. George guessed it weighed 1798 pounds. Polly guessed 906 pounds, and I guessed 1113 pounds. It really weighed 2050 pounds. How near was each of our guesses?

3. In the midway we rode on the toy train. Four people could sit in each car, and there were 9 cars. How many people could ride at once? If the train made 12 trips every hour, how many people could ride in an hour?

4. Nine thousand six hundred seventy people went through the gates of the Fair yesterday. If the tickets were 50¢ apiece, how much money was taken in?

WHY DO WE NEED ARITHMETIC?

Suppose you knew little or nothing about numbers. Think of all the things you wouldn't be able to do. You couldn't play games in which you need to know how to count. You wouldn't be able to read your telephone number. Without a knowledge of numbers you couldn't buy things at the store, or earn money by selling papers, because you wouldn't know how to make change. You see from your own experience that all of us can do many more things as we learn more and more about numbers.

How do you work with numbers? What can you do with them? You can add them, as you add your scores in playing games. You can subtract one number from another and find how much money you have left after spending part of what you had. You can multiply one number by another as you do when you find out how much five rides will cost if one ride costs six cents. You can divide one number by another to find each boy's share of a bag of marbles.

These four ways of working with numbers, by Addition, Subtraction, Multiplication and Division are called the Four Processes. You have learned all of them, but it takes much practice to be *sure* to choose the right process when you have a problem to solve.

Then again, you must be *very careful* not to make mistakes. It is time well spent to check or prove your work. A wrong answer is worth nothing at all. It tells you what is not so. It is fine to work rapidly, but it is still better to have all of your answers right.

Here is a good watchword for your arithmetic work:

FIRST BE SURE AND THEN BE QUICK

READING AND WRITING NUMBERS

Small numbers have many uses. What uses do you make of them? Name some uses for large numbers.

In order that they may be read more easily, large numbers are usually divided by commas, into groups or periods of three figures, beginning at the right. See how much easier it is to read the number 4170235 when it is written 4,170,235.

Each of the periods into which large numbers are divided has a name. The first is units, the next is thousands, the third is millions and the fourth is billions.

In each period there are three places. The first place is units, the second is tens and the third is hundreds.

Billions			Millions			Thousands			Units		
Hundreds	Tens	Units	Hundreds	Tens	Units	Hundreds	Tens	Units	Hundreds	Tens	Units
6	5	4	9	8	7	6	5	4	3	2	1

In reading large numbers begin at the left. Read the number in each period and give it the name of the period, but omit the name of the units' period. 654,987,654,321 is read, six hundred fifty-four billion, nine hundred eighty-seven million, six hundred fifty-four thousand, three hundred twenty-one.

Read these numbers:

20,175,368	20,417,365,811
162,400,524	142,602,917,436
1,307,421,890	850,325,481,245

READING AND WRITING NUMBERS

In writing numbers we generally use the Arabic numerals 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

Sometimes letters are used for numbers on clocks and watches, in numbering the chapters of books and in writing dates on monuments and public buildings. These letters, I, V, X, L, C, D and M are called Roman numerals. Can you tell why?

ROMAN NUMERALS

I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000.

To make other numbers, the Romans combined these letters. Here are the rules they used:

Repeating a letter repeats its value. I = 1, II = 2, XXX = 30.

When a letter of less value is placed after one of greater value, their values are added. VI = 6, XII = 12.

When a letter of less value is placed before one of greater value, the value of the less is taken from the greater. IV = 4, IX = 9.

Write the Roman numerals that you see on a clock. On some clock faces IIII appears in place of IV.

Write in Roman numerals: 19, 35, 150, 600, 1500.

Read these numbers: VL, XX, LX, VI, CD, XLV, CLXII, IX, XIV, MDXXII, MCMXXVII.

Write in Roman numerals the year in which you were born; 1492, 1776.

ADDITION

All your life you will need to know and want to know how to add numbers. Almost every day you will have to spend money. It is a very good thing to keep account of the money you spend.

Last month I went to the seashore. I spent \$9.13 for railroad fares, \$4.35 for things to eat, \$6.81 for a new sweater and \$3.20 for a bathing suit. How much did they all cost me?

\$ 9.13 4.35 6.81 3.20 \$23.49	Begin at the bottom and add up. To check your work begin at the top and add down. I spent \$23.49 at the seashore.

The numbers that you add are called *addends.*

The answer is called the *sum* or *amount*.

Finding the *sum* of two or more numbers is *addition.*

The sign of addition is +. It is read *and* or *plus.*

The dot that separates the dollars and cents in each addend is called a *decimal point*. In adding dollars and cents always write the decimal points under each other. The decimal point that separates the dollars and cents in your sum must be under those in the addends.

Place a dollar sign (\$) before the first addend and before the sum.

Copy and add:

1. \$52.37 + \$8.79 + \$9.46 + \$79.78 + \$47.94.

2. \$77.87 + \$17.90 + \$81.25 + \$7.65 + \$45.68.

ADDITION DRILL

First be sure and then be quick.

Add without copying. Use a folded answer paper:

1.

8	6	8	8	9	6	7	4
6	7	6	9	5	4	4	3
78	36	29	64	29	64	79	49

2.

8	2	6	9	7	9	8	8
4	7	4	3	2	9	9	3
2	5	7	7	5	9	8	9
1	8	8	2	9	8	8	9
7	5	4	5	5	6	8	9
6	4	6	7	5	7	6	6
2	7	7	7	8	6	9	8

3.

91	90	78	98	95	29
95	79	97	95	96	78
84	43	58	88	49	63
94	52	74	66	68	78
54	85	66	37	96	89
17	41	77	56	59	74

4.

$ 40.10	$47.03	$62.45	$ 54.87
22.41	2.15	.14	93.12
101.21	.05	3.04	103.30
6.00	40.23	51.93	1.36
19.47	8.17	.05	22.24

PROBLEMS

1. Here is the record of the runs scored by the fifth and sixth grade baseball teams of Franklin School. How many runs did each team make in the seven games?

	Fifth Grade Team	Sixth Grade Team
April 28	12	13
May 5	6	4
May 12	9	6
May 19	11	7
May 26	5	8
June 2	10	9
June 9	4	3

2. How much money must Peggy have to buy the supplies for a picnic lunch if the bacon costs 73¢, the eggs, 64¢, the rolls, 42¢, the butter, 30¢ and the paper plates, 15¢?

3. Three children picked cherries for their mother. On Monday they picked 64 quarts, on Tuesday, 58 quarts and on Wednesday, 37 quarts. How many quarts did they pick in all?

4. Ruth tipped up her bank and saw inside a fifty-cent piece, a quarter, 3 dimes, 2 nickels and 4 pennies. How much money did she see?

5. Suppose your uncle asked you how much money you would need to go to the amusement park, and you thought "the carfare will be 36¢, lunch, 25¢ and I should like to spend 50¢ riding on the merry-go-round and the Ferris wheel." How much should you tell your uncle you needed?

6. Make addition problems for your class to work.

ADDITION DRILL

First be sure and then be quick.

Add without copying and check:

1.

2556	1979	2222	8730
351	2769	9723	181
1287	508	916	4597
818	2540	1437	205
6355	4229	6457	8598

2.

5567	7663	9764	6893
289	4257	4560	986
868	5498	674	1397
4479	649	5278	9145
897	5353	4879	178

3.

7355	3358	4975	734
4507	246	8823	9764
756	7456	7196	797
6108	390	809	4679
5529	7702	8956	1257

4.

8467	568	2128	1676
4303	3409	637	5540
6882	739	9406	5495
976	3518	238	239
5464	8887	9285	3974

PROBLEMS

Read each problem and before working it tell what you must do to find the answer.

1. A caddy on the golf links made \$.85 on Monday, \$.55 on Tuesday, \$1.05 on Wednesday, \$.30 on Thursday, \$.75 on Friday, and \$1.50 on Saturday. How much did he make during the week?

2. A radio set was bought for \$98.76, a radio table for \$29.25, and a loud speaker for \$19. How much was paid for all?

3. One Saturday afternoon there were 1365 men, 499 women and 755 children at the ball game. How many people were there?

4. A man bought a camera for \$15.99, a leather case for \$1.60 and films for \$1.38. What was his bill?

5. Bert wished to buy a football. He earned \$1.75 by doing errands, was given \$.88 by his father for good marks and made \$1.65 as a caddy. He needed just \$1.00 more to buy a football. What did the football cost?

6. A party of school children spent the day in Delaware Park. They paid \$3.78 for trolley fares, \$4.67 for lunch, \$1.60 for ice cream cones and \$.75 for a boat ride. What was the total expense for the day?

7. One of the school boys acted as business manager for a school entertainment. The tickets cost him \$4.75, the programs, \$6.95, the costumes, \$7.58, and the janitor service, \$3.44. What was the cost of all?

8. In the circus parade there were 47 horses, 36 ponies, 16 elephants and 38 other animals. How many animals were in the parade?

SUBTRACTION

Which is more? Which is less? These are everyday questions that show why we must know how to subtract, or find the difference between numbers.

I want a radio set that will cost $24.35. I have $12.60. How much more do I need?

$24.35	**minuend**	By subtracting $12.60 from $24.35, I find that I need $11.75 more.
12.60	**subtrahend**	
$11.75	**difference** or **remainder**	To prove that no mistake has been made, add the **subtrahend** and the **remainder.** If the sum equals the **minuend** the subtraction is correct.
Proof:		
$12.60		
11.75		
$24.35		

The number from which we subtract is the *minuend.*

The number that we subtract is the *subtrahend.*

The result in subtraction is the *difference* or *remainder.*

Finding the difference between two numbers is *subtraction.*

The sign of subtraction is —. It is read *minus.*

In subtracting dollars and cents, write the decimal points under each other. Place the dollar sign ($) before the minuend and the remainder.

Tell which number is larger and how much larger:

$137.14 or $38.38 $164.53 or $75.57 $42.84 or $132.21

Tell which number is smaller and how much smaller:

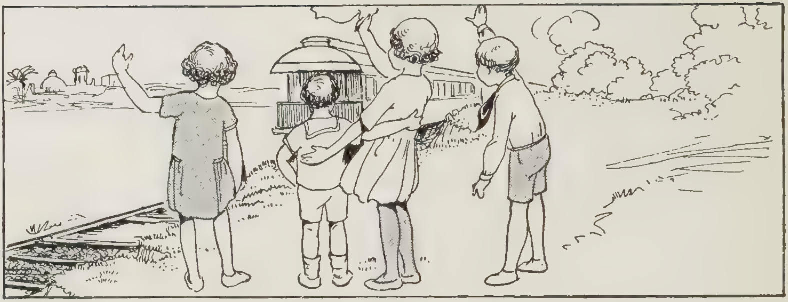
$161.28 or $77.49 $83.89 or $153.74 $98.54 or $101.05

SUBTRACTION DRILL

First be sure and then be quick.

Subtract and prove:

1. 11681 2934	2. 14779 8990	3. 11951 2077	4. 11153 2675	5. 16194 6285
6. 13905 7919	7. 13973 9094	8. 14558 9044	9. 11696 4029	10. 11766 2936
11. 13281 6275	12. 10682 7405	13. 14517 6081	14. 14945 7606	15. 72785 51317
16. 127681 41833	17. 11479 4901	18. 15911 8917	19. 15396 7587	20. 14303 4719
21. 13536 3940	22. 59720 42860	23. 10034 7924	24. 10404 6250	25. 35841 35016
26. 10751 4431	27. 53788 21695	28. 17116 7905	29. 89968 65683	30. 12622 9128
31. 14236 8001	32. 78239 67674	33. 10990 3811	34. 12758 4172	35. 72754 31461
36. 97415 61681	37. 14826 6054	38. 10182 6572	39. 13669 6633	40. 17655 9040
41. 13303 3818	42. 14963 5865	43. 15119 8620	44. 15974 9099	45. 11861 4383



TRAVELING ON THE RAILROAD

The table below shows the distance from New York to each of the most important stations on a railroad that runs between New York and Miami, Florida.

Miles	
0	New York, N. Y.
91	Philadelphia, Pa.
187	Baltimore, Md.
227	Washington, D. C.
341	Richmond, Va.
626	Charleston, S. C.
737	Savannah, Ga.
908	Jacksonville, Fla.
1293	Miami, Fla.

1. Beginning with New York, find the distance from each station to the next.

2. What city is about half way between New York and Miami?

3. Beginning with Philadelphia, find the distance from each city to Miami.

4. Which is nearer Washington, Philadelphia or Richmond? How much nearer?

5. When Janet went from Philadelphia to Miami, her friend Mary went with her as far as Washington. How much farther did Janet go than Mary?

6. A ship traveled 1189 miles in going from New York to Miami. Was this longer or shorter than the land route? How much?

SUBTRACTION DRILL

Subtract without copying:

1.

37887	107515	35747	34401
7948	44312	35703	24246

2.

12000	99900	78203	84236
5786	48191	66627	28001

3.

12622	68996	26611	56683
9528	56568	22280	14776

4.

14820	49741	87275	17275
6047	16068	23146	8417

5.

95569	13033	15364	15911
90403	7184	7465	7917

6.

11479	11168	16789	11586
4901	2294	8923	4440

7.

13345	15790	16493	15113
8390	9002	3498	8615

8.

$157.62	$293.68	$157.82	$149.14
72.24	186.62	65.82	75.51

9.

$110.76	$128.54	$169.45	$117.84
87.14	51.06	99.29	40.39

PROBLEMS

Read each problem and before working it tell what you must do to find the answer.

1. Mrs. Parker gave Tom a quarter and a fifty cent piece. She asked him to buy a loaf of bread that cost 10¢, a dozen oranges at 59¢ and a 3¢ yeast cake. She said Tom could spend the rest for candy. How much was left for Tom?

2. Janet's grandmother gave her $5.00 to buy a bathing suit. She found a red suit for $4.69. If she bought this suit, how much would she have left for a red cap?

3. Bill went to the picnic with $2.29. He spent 35¢ for rides on the roller coaster, 10¢ for ice-cream and 3¢ for candy. How much did he have left?

4. The Franklin basketball team scored 147 points last season. The Jackson team scored 58 points. How many more points did the Franklin team make?

5. Howard raised vegetables and sold them to the neighbors. He had to buy a hoe for 69¢ and seeds that cost $1.25. His vegetables sold for $18.48. How much money did he make?

6. When we left home last Saturday, the speedometer registered 323 miles. When we came back it read 401 miles. How far did we go?

7. At a valentine party 325 candy hearts were hidden and 269 were found. How many were still hidden?

8. George has 279 stamps in his collection. Bob has 178. Which boy has more? How many more has he?

9. Make subtraction problems for your classmates to work.

Many fifth grade pupils can work all of these examples within the time limits. How many can you do?

At the end of the given time for each test, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

TEN MINUTE TEST IN ADDITION AFTER COPYING

1.	2.	3.	4.	5.
5988	1450	8047	7766	5673
9710	1532	337	643	81
6958	2117	9288	58	2699
920	3163	43	5638	899
9703	95	6752	88	7999
82	506	45	4176	80
4908	1246	2947	6679	5787

6.	7.	8.	9.	10.
8007	4867	9898	3902	6440
3264	96	7597	48	9868
166	7771	694	493	2467
5555	56	9895	8438	5978
9166	8956	498	2898	9967
151	865	7894	496	758
8545	7537	7457	5979	7589

SIX MINUTE TEST IN SUBTRACTION AFTER COPYING

1.	2.	3.	4.	5.
55934	2495	15000	16860	9867
4085	1928	8712	6767	9389

6.	7.	8.	9.	10.
14519	14111	15163	13097	23788
5520	6224	6694	5060	8512

11.	12.	13.	14.	15.
15758	5656	17127	76671	12543
7994	3699	8442	13428	5106

PROBLEMS

Read each problem and before working it tell what you must do to find the answer.

1. The boys in the school baseball team bought a new glove for \$2.76, a ball for \$1.55, a mask for \$6.60, and 3 bats for 79¢ each. What was the total bill?

2. Mrs. Todd went to town and bought Mary a new coat, a hat, a dress and shoes. She spent \$37.77. When she returned home, she had \$5.25 left. How much did she have when she went to town?

3. Harry received \$7.75 for his regular week's pay and \$2.10 for extra time. During the week he spent \$3.50 for lunches and carfare. How much did he have left?

4. A School Garden Club planted a garden. It cost \$37.65 to prepare the ground, \$35.80 for plants and seeds, \$16.73 for fertilizer and \$12.14 for garden tools. What was the total expense?

5. Charles bought a bicycle for \$47.50 and spent \$9.85 for repairs. After using the bicycle for six months he sold it for \$26.89. How much did the use of the bicycle cost him?

6. Richard's mother asked him to find out how much her gas bills amounted to in 6 months. The bills were as follows: \$4.66, \$7.89, \$4.49, \$3.86, \$6.50, and \$8.78. What was the amount?

7. During one month a man spends \$80 for rent, \$5.74 for electricity, \$1.62 for water and \$53.75 for groceries. How much does he spend in all?

8. Mr. Jones paid \$965.75 for an automobile and sold it for \$668.78. Find the difference between the two prices.

MULTIPLYING BY TWO FIGURES

How much will five tickets to the ball game cost? How much will three pairs of stockings cost? You hear questions like these every day. If you know how to multiply you can answer these questions.

John's class is going to the circus. The teacher bought 34 tickets at $.75 each. John is to collect the money from the class to pay the teacher. How much must he collect?

$.75	**multiplicand**
34	**multiplier**
300	**partial product**
225	**partial product**
$25.50	**product**

John must collect $25.50.

First multiply 75 cents by 4; then by 3.

Write the right-hand figure of each partial product under the figure by which you are multiplying. Add the partial products.

To check your work multiply a second time.

The number we multiply is the *multiplicand.*

The number we multiply by is the *multiplier.*

The result in multiplication is the *product.*

These are called the *terms* in *multiplication.*

Taking one number as many times as there are units in another is *multiplication.*

The sign of multiplication is $\times$. It is read *times* or *multiplied by.* $4 \times \$8$ is read 4 *times* $8. $\$8 \times 4$ is read $8 *multiplied by* 4.

In multiplying dollars and cents by a whole number, place the decimal point between the dollars and the cents in the product. Be sure to place a dollar sign before the multiplicand and before the product.

MULTIPLICATION DRILL

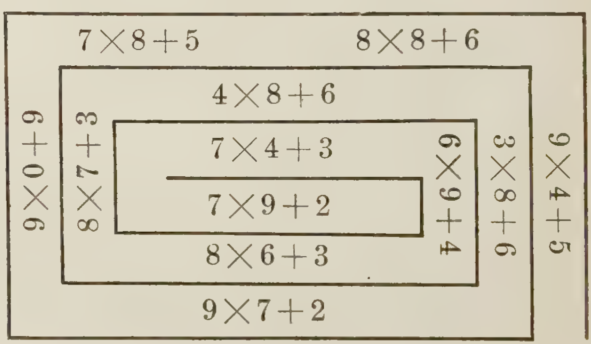
First be sure and then be quick.

Multiply:

1.	620	420	543	712	350	125	
	2	5	3	7	6	4	
2.	231	512	20	78	39	65	87
	9	8	31	13	21	12	52
3.	\$.51	\$.48	\$.41	\$.69	\$.93	\$.14	
	59	64	36	53	45	21	
4.	\$.15	\$.65	\$.49	\$.30	\$.86		
	95	17	89	87	96		
5.	\$89.80	\$28.92	\$39.67	\$49.60			
	84	76	98	97			
6.	\$47.86	\$78.29	\$86.47	\$39.47			
	78	76	49	68			

A MULTIPLICATION MAZE

Here is a multiplication maze. Begin in the middle and work yourself out. See who can get out first.



ZERO IN THE MULTIPLICAND AND MULTIPLIER

A dealer pays \$809 apiece for the automobiles he sells. One year he bought 406. What did they cost him?

\$809 406 4854 3236 \$328454	First multiply 809 by 6; then by 0, then by 4. Remember $0 \times 809 = 0$, so there is no partial product to write. Write the 6 of the 3236 under the 4 by which you are multiplying. The cost was \$328,454.

Remember: When you multiply dollars the answer, or product, is dollars.

MULTIPLICATION DRILL

Multiply:

1. 709 × 12	2. 835 × 21	3. 152 × 32	4. 401 × 105	5. 461 × 16	6. 205 × 65
7. 521 × 43	8. 921 × 61	9. 463 × 78	10. 202 × 83	11. 431 × 35	12. 605 × 95
13. 934 × 35	14. 687 × 95	15. 689 × 95	16. 735 × 87	17. 753 × 96	18. 867 × 98
19. 896 × 78	20. 807 × 78	21. 896 × 76	22. 946 × 87	23. 796 × 67	24. 724 × 802
25. 306 × 752	26. 523 × 804	27. 908 × 903	28. 604 × 902	29. 365 × 909	30. 879 × 306
31. 807 × 904	32. 807 × 735	33. 706 × 408	34. 404 × 979	35. 798 × 464	36. 809 × 848

EVERYDAY PROBLEMS

Read each problem and before working it tell what you must do to find the answer.

1. Bob had a small garden last summer. He sold 36 bunches of radishes at 5¢ a bunch, 57 heads of lettuce at 8¢ a head, and 29 quarts of string beans at 15¢ a quart. How much did he receive in all?

2. Julia's father gives her an allowance of 25¢ a week. How much did she receive in 26 weeks? In 52 weeks? In 104 weeks?

3. George and Bill went to a picnic. George rode on the roller coaster 9 times at 5¢ a ride. Bill rode 7 times at 5¢ a ride. The carfare was 37¢ each way for each boy. How much did the two spend in all?

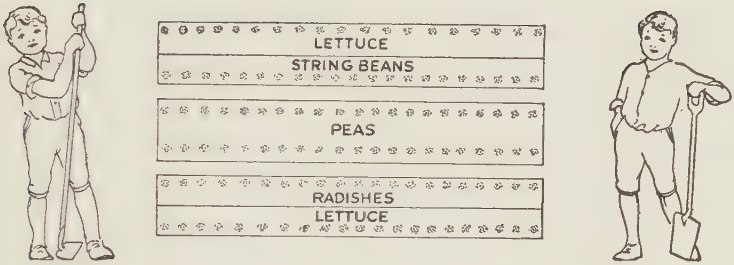
4. There are 37 pupils in our class. Each one has a reader that cost 65¢ and a speller that cost 56¢. How much did all the spellers cost? All the readers? What was the cost of the readers and the spellers?

5. Alice had a theater party on her birthday. The tickets were 78¢ apiece. If there were 7 in the party, how much did the tickets cost?

6. John sells a monthly magazine to 37 regular customers. If he makes 3¢ on each magazine, how much does he make each month? What does he make in a year?

7. The milkman delivers 45 quarts of milk to our school each day. He charges 14¢ a quart. What is the school's milk bill for one day. For five days? For four school weeks?

8. Make multiplication problems for your classmates to work.



WORKING A GARDEN

Paul and Hugh live near a vacant lot. Last spring they were allowed to use the lot to raise vegetables.

1. In March they sent for these seeds. How much did all cost?

2 lb.	string beans	at 35¢ a lb.
3 lb.	peas	at 45¢ a lb.
3 packages	radishes	at 15¢ a package
6 packages	lettuce	at 10¢ a package

2. In April they bought 12 pounds of fertilizer at 8¢ a pound, and paid a man 45¢ an hour for 7 hours work in spading the garden. They also bought a hoe that cost 89¢. What was the sum of these expenses?

3. In June they sold 23 heads of lettuce at 10¢ a head and 17 bunches of radishes at 8¢ a bunch. How much did they take in during June?

4. In July they sold 13 pecks of peas at 55¢ a peck, 27 heads of lettuce at 7¢ a head and 32 bunches of radishes at 6¢ a bunch. What were their July sales?

5. In August the boys sold 24 heads of lettuce at 7¢ a head, 14 bunches of radishes at 5¢ a bunch and 58 quarts of string beans at 15¢ a quart. How much did they take in during August?

MULTIPLYING BY NUMBERS ENDING IN ZERO

What is the total weight of 10 four-pound boxes of candy? Of 100 four-pound boxes?

$10 \times 4 = 40$
$100 \times 4 = 400$

To multiply a number by 10, annex 1 zero to the number.
To multiply by 100, annex 2 zeros.

Ten 4-pound boxes weigh 40 pounds.
One hundred 4-pound boxes weigh 400 pounds.

Multiply each of these numbers by 10; 100:

3 5 12 10 15 24 50 65 76 90 100

There are 12 oranges in a dozen. How many oranges are there in 1300 dozen?

$$\begin{array}{r} 12 \\ 1300 \\ \hline 3600 \\ 12 \\ \hline 15600 \end{array}$$

To multiply by 1300, write a zero in the product under each zero in the multiplier. Then multiply by 13.

In 1300 dozen there are 15600 oranges.

Multiply:

1. 47 by 90; 680; 800; 1700; 9800.
2. 608 by 80; 740; 900; 1600; 2400.

1. How many quarts are there in 100 pecks of apples?
2. If one automobile tire costs $20, what will 10 cost?
3. If one bushel of oats weighs 32 pounds, find the weight of 1200 bushels.
4. A farmer sold 200 barrels of apples at $5 a barrel. For how much did the apples sell?

MULTIPLYING IN THE EASIER WAY

Find the cost of 45 fountain pens at $3 apiece.

$3 45 15 12 $135	45 3 135	It is often easier to use the smaller number as the multiplier. The pens cost $135.

Multiply in the easier way:

476 × $.98	857 × $58	974 × $64
865 × $78	798 × $.76	845 × $47

1. If an automobile trip costs 4 cents a mile and it is 227 miles from New York to Washington, find the cost of the trip to Washington and return.

2. In the school lunch room 496 children each bought a 4¢ sandwich. How much did all of the sandwiches cost?

3. A Vermont farmer shipped 758 gallon cans of maple syrup that weighed 11 pounds apiece. Find the weight of the shipment.

4. My father travels 18 miles a day in going to and from his store. How far does he travel in a year of 312 working days?

5. John's father sells eggs. Last month he sold 468 dozen. How many eggs was that?

6. A grocer had a special sale of twelve-pound bags of flour. He sold 376 bags. How many pounds did he sell?

7. Find the cost of 675 dolls at $.75 each.

TESTS

Many fifth grade pupils can do all of these examples within the time limits. How many can you do?

At the end of the given time for each test, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

THREE MINUTE TEST IN ADDITION WITHOUT COPYING

7452	9896	68	8889
897	9695	6455	7689
8894	65	77	89
63	3824	687	6879
5784	499	5225	2799
73	6447	77	2699
561	89	531	79

FOUR MINUTE TEST IN SUBTRACTION WITHOUT COPYING

1.	85712	71786	97442	11955
	17124	44339	10091	1976
2.	15719	119643	14354	95380
	8076	88665	5805	33902
3.	65632	11706	13286	14186
	60235	4870	6284	8439

NINE MINUTE TEST IN MULTIPLICATION AFTER COPYING

1.	594	978	657	683	782	804
	78	47	98	65	96	46
2.	630	857	567	949	638	301
	98	89	75	69	98	57

SHORT DIVISION

Six boys on a hike spent $4.86. What was each boy's share? Mary swam ninety feet. How many yards was that? To answer questions like these, you must know how to divide.

The school children of our city collected 4065 used toys. They were divided equally among 4 orphans' homes. How many toys were there for each home?

quotient	1016 and 1 **remainder**	4 is contained in 4;
divisor	$4\overline{)4065}$ **dividend**	in 0; in 6; in 25.

Proof:

$$\begin{array}{r} 1016 \\ \underline{\quad 4} \\ 4064 \\ \underline{\quad 1} \\ 4065 \end{array}$$

There were 1016 toys for each home and 1 left over.

To prove division, multiply the **quotient** by the **divisor** and add the **remainder**, if there is one. If the answer equals the **dividend** the division is correct.

The number that we divide is the *dividend*.

The number by which we divide is the *divisor*.

The result in division is the *quotient*.

The part of the dividend that is left over is the *remainder*.

Finding how many times one number is contained in another is *division*. The sign of division is ÷.

Divide and prove:

1. $5\overline{)459}$	**2.** $3\overline{)150}$	**3.** $3\overline{)192}$	**4.** $5\overline{)360}$	**5.** $7\overline{)365}$
6. $4\overline{)328}$	**7.** $8\overline{)424}$	**8.** $9\overline{)641}$	**9.** $9\overline{)747}$	**10.** $4\overline{)388}$
11. $2\overline{)1806}$	**12.** $3\overline{)2104}$	**13.** $8\overline{)4808}$	**14.** $6\overline{)6079}$	

SHORT DIVISION DRILL

Divide without copying and prove:

1.	$2\overline{)2068}$	$7\overline{)6111}$	$4\overline{)9668}$	$5\overline{)1506}$	$3\overline{)1026}$
2.	$4\overline{)2157}$	$6\overline{)5916}$	$3\overline{)1503}$	$6\overline{)1806}$	$2\overline{)1124}$
3.	$9\overline{)8370}$	$9\overline{)5202}$	$7\overline{)6308}$	$8\overline{)6984}$	$5\overline{)4910}$
4.	$5\overline{)3780}$	$3\overline{)2091}$	$2\overline{)1974}$	$8\overline{)1608}$	$6\overline{)5850}$
5.	$8\overline{)7648}$	$4\overline{)2716}$	$4\overline{)3506}$	$3\overline{)2061}$	$9\overline{)7884}$
6.	$4\overline{)3868}$	$8\overline{)4320}$	$7\overline{)2961}$	$9\overline{)4068}$	$7\overline{)6126}$
7.	$3\overline{)2928}$	$4\overline{)8032}$	$5\overline{)2395}$	$6\overline{)5052}$	$6\overline{)4116}$
8.	$7\overline{)4445}$	$3\overline{)1036}$	$8\overline{)3720}$	$9\overline{)7659}$	$7\overline{)4746}$
9.	$3\overline{)1794}$	$7\overline{)3920}$	$9\overline{)3384}$	$2\overline{)1956}$	$4\overline{)2194}$
10.	$6\overline{)4518}$	$5\overline{)4850}$	$7\overline{)2058}$	$9\overline{)8505}$	$8\overline{)3094}$
11.	$8\overline{)7568}$	$2\overline{)1802}$	$5\overline{)3379}$	$6\overline{)2454}$	$9\overline{)5445}$

PART TAKING DRILL

Give the fractional part of each number as quickly as you can:

$\frac{1}{2}$ of 18;	14;	8;	12;	6;	10;	4;	2;	20;	16
$\frac{1}{4}$ of 12;	20;	4;	28;	40;	16;	32;	8;	24;	36
$\frac{1}{8}$ of 48;	16;	40;	72;	56;	24;	64;	80;	8;	32
$\frac{1}{3}$ of 18;	9;	15;	24;	3;	21;	12;	30;	6;	27
$\frac{1}{6}$ of 54;	36;	12;	48;	6;	18;	30;	24;	42;	60
$\frac{1}{9}$ of 9;	45;	63;	81;	27;	90;	54;	72;	36;	18
$\frac{1}{5}$ of 10;	25;	40;	35;	15;	20;	45;	50;	30;	5
$\frac{1}{10}$ of 90;	70;	50;	30;	10;	80;	60;	40;	20;	100
$\frac{1}{7}$ of 42;	56;	63;	49;	28;	35;	21;	70;	7;	14

Give the quotients and the remainders:

1.	$46 \div 5$	$17 \div 3$	$45 \div 7$	$38 \div 5$
2.	$19 \div 3$	$39 \div 7$	$35 \div 4$	$41 \div 8$
3.	$69 \div 9$	$78 \div 9$	$39 \div 4$	$23 \div 3$
4.	$19 \div 2$	$26 \div 7$	$53 \div 8$	$38 \div 6$
5.	$49 \div 6$	$27 \div 4$	$29 \div 4$	$59 \div 7$
6.	$28 \div 3$	$48 \div 9$	$57 \div 6$	$51 \div 7$
7.	$55 \div 9$	$34 \div 6$	$31 \div 7$	$26 \div 3$
8.	$69 \div 8$	$29 \div 9$	$88 \div 9$	$43 \div 9$

LONG DIVISION

A gardener planted a large bed of tulip bulbs. If he had 485 bulbs and planted 21 in a row, how many rows did he plant and how many bulbs were left over?

$$\begin{array}{r} 23 \\ 21\overline{)485} \\ \underline{42} \\ 65 \\ \underline{63} \\ 2 \end{array}$$

21 is contained in 48 about as many times as 2 is contained in 4 or 2 times. Write 2 over 8.
Multiply 21 by 2. $21 \times 2 = 42$.
Subtract 42 from 48. $48 - 42 = 6$.
Bring down 5.
21 is contained in 65 about as many times as 2 is contained in 6 or 3 times. Write 3 over 5.
$21 \times 3 = 63$. $65 - 63 = 2$.

There were 23 rows and 2 bulbs left over.

Remember: In division each number to be subtracted must be less than the number from which it is to be taken.

Each remainder must be less than the divisor.

After we place the first figure in the quotient, there must be a figure in the quotient over each dividend figure we bring down to make a new dividend.

Copy and divide:

1. $21\overline{)651}$	2. $21\overline{)448}$	3. $31\overline{)992}$	4. $31\overline{)775}$
5. $41\overline{)984}$	6. $41\overline{)1312}$	7. $21\overline{)918}$	8. $22\overline{)506}$
9. $51\overline{)1173}$	10. $61\overline{)854}$	11. $32\overline{)776}$	12. $42\overline{)1302}$
13. $24\overline{)7476}$	14. $71\overline{)7952}$	15. $62\overline{)13082}$	16. $33\overline{)7623}$

DIVIDING WITH ZERO IN THE QUOTIENT

Twenty-one boy scouts passed out 4368 telephone directories. What was the average number for each boy?

$$\begin{array}{r} 208\\ 21\overline{)4368}\\ \underline{42}\\ 168\\ \underline{168} \end{array}$$

21 is contained in 43 about as many times as 2 is contained in 4 or 2 times. Write 2 over 3. $2 \times 21 = 42$. $43 - 42 = 1$. Bring down 6.
21 is not contained in 16. Write 0 over 6. Bring down 8 and divide 168 by 21.

Each boy passed out an average of 208 directories.

Divide and prove:

$43\overline{)89053}$ $36\overline{)10980}$ $64\overline{)13248}$ $58\overline{)17574}$ $53\overline{)16377}$

FINDING THE CORRECT QUOTIENT FIGURE

A fruit dealer sold 8675 peaches in baskets that held 25. How many baskets did he use?

$$\begin{array}{r} 347\\ 25\overline{)8675}\\ \underline{75}\\ 117\\ \underline{100}\\ 175\\ \underline{175} \end{array}$$

2 is contained in 8 four times, but 4 times 25 is 100, which is more than 86. Try 3 times 25.
2 is contained in 11 five times, but 5 times 25 is 125, which is more than 117. Try 4 times 25.
2 is contained in 17 eight times, but 8 times 25 is 200, which is more than 175. Try 7 times 25.

347 baskets were used.

Divide and prove:

1. $43\overline{)3741}$	2. $51\overline{)45033}$	3. $27\overline{)14130}$	4. $14\overline{)91364}$
5. $27\overline{)1326}$	6. $88\overline{)4576}$	7. $49\overline{)2548}$	8. $37\overline{)1998}$
9. $47\overline{)23829}$	10. $44\overline{)12364}$	11. $38\overline{)24871}$	12. $77\overline{)14399}$
13. $46\overline{)4991}$	14. $24\overline{)14616}$	15. $32\overline{)16288}$	16. $93\overline{)76260}$
17. $72\overline{)50976}$	18. $61\overline{)3965}$	19. $81\overline{)50328}$	20. $33\overline{)23496}$

DIVIDING DOLLARS AND CENTS

A dealer bought 25 basketballs for \$118.75. How much did each cost?

$$\begin{array}{r} \$4.75 \\ 25\overline{)\$118.75} \\ 100 \\ \hline 18\,7 \\ 17\,5 \\ \hline 1\,25 \\ 1\,25 \\ \hline \end{array}$$

Dollars and cents are divided in the same way that other numbers are divided.

Be sure to put a decimal point in the quotient over the decimal point in the dividend.

Each basketball cost \$4.75.

Copy and divide:

1. $16\overline{)\$44.80}$	2. $32\overline{)\$195.20}$	3. $24\overline{)\$90.00}$	4. $41\overline{)\$113.16}$
5. $28\overline{)\$213.92}$	6. $25\overline{)\$91.00}$	7. $59\overline{)\$115.05}$	8. $69\overline{)\$135.24}$
9. $91\overline{)\$694.33}$	10. $78\overline{)\$452.40}$	11. $84\overline{)\$78.98}$	12. $67\overline{)\$438.18}$
13. $77\overline{)\$64.68}$	14. $61\overline{)\$230.58}$	15. $90\overline{)\$674.10}$	16. $68\overline{)\$437.92}$
17. $38\overline{)\$37.62}$	18. $58\overline{)\$59.74}$	19. $87\overline{)\$525.48}$	20. $60\overline{)\$51.72}$

PROBLEMS

1. David can address 35 envelopes in one-half hour. How long will it take him to address 315 envelopes?

2. If a man earns $4800 per year, what is his monthly salary?

3. A builder paid $192 for 24 doors for a school building. Find the cost of each door.

4. A planter sold 18 bales of cotton that together weighed 9,000 pounds. What was the average weight of the bales?

5. An American seaplane made a trip from Newfoundland to the Azores, a distance of 1,200 miles, in 15 hours. What was the average speed per hour?

6. A Florida strawberry grower shipped 14,816 quarts of berries during a week. If there are 32 quarts in a crate, how many crates did he ship?

7. A fur dealer bought 80 coats at a cost of $12,000. If the coats were the same price, what did each coat cost him?

8. A man paid $3,000 for a piece of land, and spent $900 in having it laid out in 13 building lots. How much did each lot cost him?

9. The head of a department store bought a one-ton delivery truck which cost $850. How many such trucks could he buy for $9,350?

10. A builder sold 12 houses at the same price and received $94,200. What was the price of each house?

11. A ranchman spent $20,088 in buying cattle for his ranch at $72 apiece. How many did he buy?

LONG DIVISION DRILL

1.	20)480	21)644	21)861	22)462
2.	31)2077	42)721	40)2360	30)1830
3.	61)2196	24)1872	39)2977	61)3233
4.	49)4382	32)27424	27)15957	71)52398
5.	14)9121	92)4899	83)56357	69)25668
6.	57)56145	88)72688	93)44299	84)55104
7.	74)20646	66)42592	44)38478	24)15672
8.	54)11772	79)31679	61)59902	89)79388
9.	69)25208	99)18315	75)29025	45)27324
10.	85)5780	34)10030	64)2960	33)27159
11.	64)10368	94)5922	56)23464	38)15466
12.	24)19368	54)27486	85)17425	56)34048
13.	81)46683	27)24327	44)30888	31)28024
14.	42)17136	35)17717	48)19584	67)32964
15.	29)$166.17	72)$686.88	86)$853.98	58)$551.00
16.	82)$375.56	96)$822.72	94)$705.00	74)$537.24
17.	23)$111.78	51)$217.26	80)$1539.20	42)$382.20

THREE FIGURE DIVISORS

A farmer is setting out a field of cabbages. If he is setting 435 plants in a row and has 129,164 plants, how many rows will he have? How many plants will he have left over?

$$\begin{array}{r} 296 \\ 435\overline{)129164} \\ \underline{870} \\ 4216 \\ \underline{3915} \\ 3014 \\ \underline{2610} \\ 404 \end{array}$$

435 is contained in 1291 about as many times as 43 is contained in 129.

43 is contained in 129 three times, but 3×435 is 1305, which is more than 1291. Try 2×435.

43 is contained in 421 nine times.

43 is contained in 301 seven times, but $7 \times 435 = 3045$, which is more than 3014. Try 6×435.

The farmer will have 296 rows and 404 cabbages left over.

Copy, divide and prove:

1. $572\overline{)52624}$	**2.** $201\overline{)10854}$	**3.** $796\overline{)45372}$
4. $522\overline{)54458}$	**5.** $629\overline{)30821}$	**6.** $352\overline{)12656}$
7. $871\overline{)54873}$	**8.** $919\overline{)23894}$	**9.** $593\overline{)10081}$
10. $197\overline{)13002}$	**11.** $256\overline{)13568}$	**12.** $816\overline{)47327}$
13. $529\overline{)35972}$	**14.** $293\overline{)12306}$	**15.** $724\overline{)61540}$
16. $961\overline{)53816}$	**17.** $429\overline{)25948}$	**18.** $537\overline{)19863}$
19. $422\overline{)18990}$	**20.** $706\overline{)66364}$	**21.** $191\overline{)90725}$

DIVISION WITH NUMBERS ENDING IN ZERO

If an airplane travels at the rate of 100 miles an hour, how many hours would it take it to go 3000 miles?

$$\begin{array}{r} 30 \\ 100\overline{)3000} \\ \underline{300} \\ 0 \end{array} \qquad \textit{or} \qquad \begin{array}{r} 30 \\ 1\cancel{0}\cancel{0}\overline{)30\cancel{0}\cancel{0}} \end{array}$$

You may find the answer in two ways, but when both the dividend and the divisor end in one or more 0's, it is easier to mark off the same number of 0's from both dividend and divisor before you divide.

The airplane would take 30 hours to go 3000 miles.

Divide these numbers in the easier way:

1. $40 \div 10$	9. $500 \div 50$	17. $2000 \div 100$
2. $60 \div 30$	10. $600 \div 30$	18. $4000 \div 200$
3. $80 \div 20$	11. $800 \div 40$	19. $8000 \div 100$
4. $80 \div 40$	12. $900 \div 30$	20. $8800 \div 220$
5. $90 \div 30$	13. $800 \div 10$	21. $6600 \div 110$
6. $100 \div 10$	14. $400 \div 20$	22. $5500 \div 110$
7. $200 \div 10$	15. $600 \div 30$	23. $4800 \div 120$
8. $300 \div 30$	16. $900 \div 30$	24. $6000 \div 150$

1. How many 10¢ pieces are there in one dollar?
2. How many 20¢ cakes can you buy for one dollar?
3. How many 30¢ toys can you buy for three dollars?

WHAT WE MUST KNOW AND WHAT WE MUST DO TO SOLVE A PROBLEM

We must know what the problem tells us, *what is given.*

We must know what the problem asks us to do, *what we are to find out.*

1. The balloon man at the circus sold 112 balloons one day, 46 the next and 83 the third day. How many did he sell in the three days?

The problem tells the number of balloons sold each day. It asks us the number sold in three days.

We find the number the balloon man sold by adding his sales for the three days. How many did he sell?

This is a *one-step* problem. There is only one thing to find out.

2. Fred had $5.00. He bought 3 tennis balls at 40¢ each. How much money did he have left?

The problem tells us how much Fred paid for each tennis ball and how many he bought at that price. It also tells us how much money he had to start with. It asks how much money he had left.

We must first find out how much Fred spent and then find out how much he had left.

He spent three times the price of one tennis ball, or $1.20.

He had left the difference between what he had to start with, $5.00, and what he spent, $1.20. How much did he have left?

This is a *two-step* problem because there are two things to find out.

PROBLEMS

Read each of these problems carefully and be able to tell *what is given, what we are to find* and *what we must do to find it.*

1. Four boys working together picked 160 quarts of berries and sold them at 15 cents a quart. If they shared the money equally, how much did each boy have?

2. Alice received an allowance of 45 cents a week for 16 weeks. She saved $\frac{1}{5}$ of the whole amount. How much did she save?

3. Mary's mother gave her $2 for a birthday present. She spent 60¢ for a doll and paid $\frac{1}{4}$ of what she had left for a box of candy. How much did the candy cost?

4. Howard's father earns $150 a month. If he spends $75 a month for household expenses and puts $\frac{1}{5}$ of what he has left in the bank, how much does he put in the bank?

5. From a barrel containing 225 pounds of sugar a grocer sold 75 pounds and put the rest in 5-pound bags. How many 5-pound bags did he have?

6. After using 108 pens from a box containing 144 the teacher received a new supply of 72. How many new pens did she have then?

7. At the beginning of the school year there were 498 school books in Tom's room. During the year 94 worn out books were destroyed and 175 new ones were purchased. How many books were there at the end of the year?

8. Rose bought a pair of gloves for $2.20 and a pair of shoes for $5. She gave the merchant a ten-dollar bill. How much change was due her?

FINDING AVERAGES

Here is the weight of each boy on our school basketball team: Bob, 75 pounds; John, 73 pounds; Paul, 68 pounds; James, 81 pounds; Ted, 72 pounds. What is the average weight of the team?

75 73 68 81 72 369	$5\overline{)369}$ = $73\frac{4}{5}$	First add the weights of the five boys on the team. Then divide the sum of their weights by the number of boys, 5. $73\frac{4}{5}$ pounds is the average weight of the team.

Remember: In division, the remainder may be written as, 4 remainder, or it may be written as a fraction, $\frac{4}{5}$, using the remainder as the numerator and the divisor as the denominator of the fraction.

1. Find the average temperature for the week when the daily temperature was:

Sunday	Monday	Tuesday	Wednesday
78	81	86	75

Thursday	Friday	Saturday
80	74	82

2. Mother bought 3 presents for Christmas. She paid $4.59 for one, $2.98 for another and $5.84 for the third. What was the average price paid?

3. A school with 18 classrooms has 612 pupils. Find the average number of pupils in each room.

4. Two hundred seventy-six pupils eat in the school cafeteria. The cash register showed one day that $52.44 had been received. What was the average price of the pupils' lunches?

TESTS

Many fifth grade pupils can do all of these examples within the time limits. How many can you do?

At the end of the given time for each test, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

THREE MINUTE TEST IN ADDITION WITHOUT COPYING

4690	5780	9788	$95.99
6424	38	752	.93
75	548	99	.35
8825	777	3899	2.24
67	6428	699	76.48
576	78	4756	.96
4816	4361	98	45.29

THREE MINUTE TEST IN SUBTRACTION WITHOUT COPYING

83579	110369	166435	159417	119153
34393	21909	86480	90840	19675
$133.03	$149.69	$135.11	$159.71	$146.18
38.18	58.71	47.62	90.94	88.34

EIGHT MINUTE TEST IN MULTIPLICATION AFTER COPYING

$86.51	$69.32	$95.07	$30.49	$13.86
85	69	47	68	97
982	754	316	207	179
604	709	807	339	806

FIFTEEN MINUTE TEST IN DIVISION AFTER COPYING

36)12040	19)17437	25)2675	47)14852
83)72927	58)43848	49)15533	80)37840

PROBLEMS

1. John picked 65 quarts of strawberries from his strawberry bed and sold them at 28 cents a quart. How much was he paid for the 65 quarts?

2. Ted got a book from the library. If there are 294 pages in the book, how many must he read each day on an average in order to finish the book in two weeks?

3. The supplies in the third grade average 55¢ for each pupil. How much will the supplies cost for the 2736 pupils in the third grades of the city schools?

4. Gertrude's uncle gave her $7.00 for her birthday. She bought a camera that cost $4.98, films that cost 30¢ and she paid 48¢ for having the films developed and prints made. How much did she have left?

5. Find the cost of 4 dozen boxes of writing paper at 25 cents a box.

6. Mr. Robinson pays $42 a month for rent. How much does he pay each year? In seven years?

7. There are 484 trees in an orchard and $\frac{1}{4}$ of them are peach trees. How many peach trees are there in the orchard?

8. One bale of cotton weighed 500 lb., another weighed 476 lb., another weighed 539 lb., another weighed 466 lb., and another weighed 510 lb. How much did the five bales weigh?

9. One load of coal weighed 6307 lb., another weighed 4810 lb. Find the difference in weight.

10. An oil barrel holds 42 gallons. How many barrels of oil are there in a tank-car containing 10,000 gallons?

PROBLEMS

11. The pupils in a class raised $5.00 to send flowers to a sick classmate at the hospital. Each of the 30 children gave 15 cents. The teacher gave the rest. How much did the teacher give?

12. A farmer's wife sold 5 dozen eggs at 36 cents a dozen. She spent the money for fruit jars at 12 cents each. How many fruit jars did she buy?

13. Some Boy Scouts bought 6 tents at $19.50 each and paid $37.75 for furnishings for the tents. What was the total expense?

14. A company of Boy Scouts while in camp used 30 dozen eggs at 45 cents a dozen and 38 pounds of butter at 56 cents a pound. How much did these two articles of food cost?

15. Harold wanted a bicycle that cost $45. When his vacation began he had $8.75. He earned enough during the vacation to buy the bicycle. What did he earn?

16. Mrs. Jones paid $12.88 for the material for a dress. Then she paid a dressmaker $3.75 a day for 3 days for making it. How much did the dress cost?

17. Mr. Todd earns $167 a month. He plans to spend $80 a month and save the rest. At that rate, how much will he save in a year?

18. A dealer sold 31 radio sets, all at the same price. If he received $2480 for the 31 sets, how much was that apiece?

19. According to the census of 1790 the population of the United States was 3,929,314. The census of 1920 showed a population of 105,683,108. What was the gain in the population of the United States between 1790 and 1920?

TESTING OUR PROGRESS

Many fifth grade pupils can work all of these examples in 12 minutes. How many can you do?

At the end of 12 minutes make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

Copy only when necessary:

1. $\begin{array}{r} 665 \\ 69 \\ 638 \\ 79 \\ \underline{982} \end{array}$

2. $\begin{array}{r} 14178 \\ \underline{-8304} \end{array}$

3. $\begin{array}{r} 7804 \\ \underline{\times 9} \end{array}$

4. $8\overline{)5880}$

5. $8 \times 8 \times 7 =$

6. $70 \times \$9.85 =$

7. $\begin{array}{r} 372 \\ \underline{\times 608} \end{array}$

8. $\begin{array}{r} 15111 \\ \underline{-7614} \end{array}$

9. $\begin{array}{r} 587 \\ 59 \\ 947 \\ 588 \\ \underline{59} \end{array}$

10. $\frac{1}{4}$ of $64 =$

11. If there were 200 days in a school year and Mary Louise went to school 189 days, how many days was she absent during the school year? If there were 365 days in the whole year, how many days was she not in school during the whole year?

12. At a school entertainment the children sold 108 tickets at 25¢ each. $4.75 was taken in at the door. How much money was collected in all?

Rate yourself—

1 to 7 correct = Poor	**9 or 10 correct = Good**
8 correct = Fair	**11 or 12 correct = Excellent**

TESTING OUR PROGRESS

Many fifth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

Copy only when necessary:

1. $\begin{array}{r} 13693 \\ -7705 \\ \hline \end{array}$

2. $\begin{array}{r} \$80.72 \\ .78 \\ 3.49 \\ .56 \\ 46.69 \\ \hline \end{array}$

3. $24\overline{)45818}$

4. $\begin{array}{r} 7898 \\ \times 68 \\ \hline \end{array}$

5. Write in a column and add: \$4.16, \$12.07, \$.89, \$.07.

6. Ruth's mother is making her a dress. It takes 4 yards of muslin at 87¢ a yard, and she spent 98¢ for other materials. Find the cost of the dress.

7. Ralph went to the store and bought 9 pounds of sugar at 7¢ a pound. How much change was due from a two-dollar bill?

8. $361\overline{)59501}$

9. $\begin{array}{r} 604 \\ \times 98 \\ \hline \end{array}$

10. $\begin{array}{r} 14909 \\ -5820 \\ \hline \end{array}$

11. $\begin{array}{r} \$64.23 \\ .86 \\ 1.26 \\ .19 \\ 92.92 \\ 4.39 \\ \hline \end{array}$

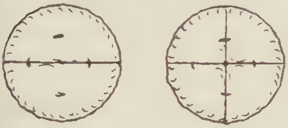
12. If 200 pupils each give 25¢ to the Junior Red Cross, how much do all give?

Rate yourself—

1 to 7 correct = Poor	9 or 10 correct = Good
8 correct = Fair	11 or 12 correct = Excellent

FRACTIONS

Cut this pie into sixths. Please run to the store and buy me three-fourths of a dozen rolls. Here is a quarter of a dollar for your allowance. Have any of these things been said to you today?



The first picture shows a pie cut into two equal pieces. Each piece is one-half of the pie. One-half is written $\frac{1}{2}$. The second picture shows a pie cut into four equal pieces. Each piece is one-fourth of the pie. One-fourth is written $\frac{1}{4}$. Three-fourths is written $\frac{3}{4}$.

A pie, a dozen, a dollar, a number or anything which is considered as a whole thing is called a *unit*.

One or more of the equal parts of a unit is called a *fraction*. $\frac{1}{2}$, $\frac{1}{4}$, $\frac{4}{5}$, $\frac{5}{6}$, $\frac{3}{8}$ are fractions.

The number below the line in a fraction is called the *denominator*.

The number above the line in a fraction is called the *numerator*.

The numerator and the denominator are called the *terms of a fraction*.

The *denominator* shows into how many equal parts some unit is divided.

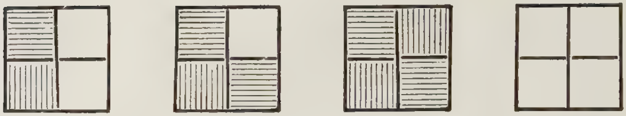
The *numerator* shows how many of the equal parts are taken.

Read these fractions and tell what each numerator and each denominator shows:

$\frac{2}{3}$, $\frac{5}{8}$, $\frac{3}{10}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{1}{6}$

Write as many fractions as you can in one minute. Then read them.

KINDS OF FRACTIONS



Into how many equal parts is each of these squares divided? What is each part called? How many of these parts make a whole square?

How many of the equal parts are shaded in the first square? Write the fraction two-fourths. How many of the equal parts are shaded in the second square? Write the fraction three-fourths. Are the numerators of these two fractions larger or smaller than the denominators?

When the numerator is smaller than the denominator the fraction is called a *proper fraction.*

How many fourths are shaded in the third square? How many fourths are shaded in the first and second squares together? In the second and third squares together? Write four-fourths, five-fourths, seven-fourths. In each of these fractions how does the numerator compare with the denominator in size?

When the numerator is as large as, or larger than the denominator, the fraction is called an *improper fraction.*

How many of the large squares have no shading? Write the number. Can you write a number that shows the whole unshaded square and also the number of unshaded fourths in the first and second squares?

The number 1 is a whole number, or an integer. $\frac{3}{4}$ is a fraction. A whole number and a fraction used together make a *mixed number.* $1\frac{3}{4}$ is a mixed number.

Write 10 proper fractions; 10 improper fractions; 10 mixed numbers.

CHANGING A WHOLE NUMBER TO AN IMPROPER FRACTION

Sometimes in working with numbers we want to change a whole number to a fraction.

We may have four melons and want to know how many people can be served if each person has $\frac{1}{6}$ of a melon.

$$1 = \frac{6}{6} \quad 4 = 4 \times \frac{6}{6} = \frac{24}{6}$$

How to Change a Whole Number to an Improper Fraction

$4 = \frac{}{6}$	Multiply the whole number by the denominator of the fraction to which you wish to change it.
$4 \times 6 = 24$	
$4 = \frac{24}{6}$	Place the product over this denominator.

How many halves are there in 2 units; in 3; in 5?

How many thirds are there in 1 unit; in 2; in 4?

How many fifths are there in 2 units; in 3; in 6?

Change each of these numbers to fourths, to sixths, to eighths, to thirds, to halves, and name the kind of fraction in each answer:

3 5 7 9 11 13 15 25

1. How many $\frac{1}{4}$ dollars should you receive in change for nine whole dollars?

2. $\frac{1}{16}$ of a watermelon was served to each person at a picnic. Two melons were served. How many sixteenths was that?

3. $\frac{1}{3}$ of a yard of silk was used in trimming a certain style of hat. 15 yards would trim how many hats of the same style?

CHANGING A MIXED NUMBER TO AN IMPROPER FRACTION

Sometimes we need to change a mixed number to an improper fraction. We may have $3\frac{1}{2}$ oranges and we may need to know how many $\frac{1}{2}$ oranges we can serve for breakfast.

$$1 = \frac{2}{2} \quad 3 = 3 \times \frac{2}{2} \text{ or } \frac{6}{2}$$

$$3\frac{1}{2} = \frac{6}{2} + \frac{1}{2} = \frac{7}{2}$$

There are 7 half oranges in $3\frac{1}{2}$ oranges.

How to Change a Mixed Number to an Improper Fraction

$3\frac{1}{2} = \frac{\ }{2}$	Multiply the whole number by the denominator of the fraction.
$3 \times 2 = 6$	
$6 + 1 = 7$	Add the numerator to the product.
$3\frac{1}{2} = \frac{7}{2}$	Place the result over the denominator.

Change these mixed numbers to improper fractions:

1.	$1\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{3}$	$4\frac{2}{3}$	$5\frac{1}{8}$	$6\frac{3}{4}$
2.	$7\frac{3}{8}$	$5\frac{1}{2}$	$4\frac{1}{5}$	$6\frac{5}{8}$	$7\frac{3}{5}$	$3\frac{1}{6}$
3.	$8\frac{1}{2}$	$10\frac{2}{5}$	$6\frac{5}{12}$	$5\frac{5}{6}$	$2\frac{7}{8}$	$9\frac{4}{5}$
4.	$11\frac{2}{3}$	$7\frac{1}{10}$	$4\frac{3}{20}$	$8\frac{3}{8}$	$6\frac{4}{5}$	$4\frac{5}{12}$

1. If you had nine and a half dollars in half dollars, how many half dollars would you have?

2. A cooking teacher divided $5\frac{3}{4}$ cups of milk, giving each pupil $\frac{1}{4}$ cup. How many $\frac{1}{4}$ cups did she have?

3. Paul and Anne sold $5\frac{5}{6}$ quarts of lemonade at their stand. How many glasses did they serve, if each glass contained $\frac{1}{6}$ of a quart?

CHANGING AN IMPROPER FRACTION TO A WHOLE OR A MIXED NUMBER

When $\frac{15}{4}$ dollars are changed to whole dollars, how many dollars are there and how many quarters are left over?

As $\frac{4}{4} = 1$, $\frac{15}{4} = 15 \div 4 = 3$ and 3 remainder or $3\frac{3}{4}$.

How to Change an Improper Fraction to a Whole or a Mixed Number

$\frac{15}{4} = ?$ units	Divide the numerator by the denominator.
$4\overline{)15}$ gives $3\frac{3}{4}$; $\frac{15}{4} = 3\frac{3}{4}$	If there is a remainder, write it as the numerator of a fraction having the same denominator as the improper fraction.

Change these improper fractions to whole or mixed numbers:

1.	$\frac{3}{2}$	$\frac{12}{12}$	$\frac{17}{3}$	$\frac{27}{4}$	$\frac{69}{4}$	$\frac{10}{5}$
2.	$\frac{7}{3}$	$\frac{11}{4}$	$\frac{16}{5}$	$\frac{24}{9}$	$\frac{32}{10}$	$\frac{6}{6}$
3.	$\frac{25}{4}$	$\frac{21}{2}$	$\frac{28}{9}$	$\frac{40}{7}$	$\frac{30}{7}$	$\frac{48}{12}$
4.	$\frac{64}{7}$	$\frac{44}{4}$	$\frac{22}{3}$	$\frac{10}{10}$	$\frac{66}{7}$	$\frac{11}{9}$

1. Tom sold tickets at a school play. He received 48 quarters. How many whole dollars was that? He received 19 half dollars. How many dollars was that?

2. At a party $\frac{1}{6}$ of a quart of ice cream was served to each of 24 people. How many quarts were served?

3. If you walk $\frac{18}{3}$ miles on a hike, how many whole miles do you walk?

4. In a school lunch room, the pies were cut in sixths. How many pies were cut to make 54 pieces?

FRACTION DRILL

1. Change each of these numbers to eighths, to thirds, to sixths: 4 6 17 14 19 22 31 23

Name the kind of fraction you have in each answer.

2. Change these mixed numbers to improper fractions: $1\frac{1}{3}$ $7\frac{5}{8}$ $2\frac{3}{10}$ $11\frac{3}{5}$ $3\frac{5}{6}$ $5\frac{1}{12}$

3. Change these improper fractions to whole or mixed numbers: $\frac{7}{5}$ $\frac{21}{3}$ $\frac{31}{7}$ $\frac{36}{12}$ $\frac{34}{8}$ $\frac{18}{4}$

PROBLEMS

1. One cup of milk is $\frac{1}{4}$ of a quart. How many cups are there in 6 quarts of milk?

2. Bill's father sent him to the bank with a five-dollar bill to be changed for quarter dollars. How many quarters should he receive?

3. Mary had two and one-quarter dollars in 25¢ pieces. How many quarters did she have?

4. Ruth picked $6\frac{1}{2}$ pecks of peas. How many $\frac{1}{2}$ peck baskets could she fill?

5. Four Boy Scouts delivered posters for the Red Cross. They measured the distance they walked, counting each block $\frac{1}{8}$ of a mile. John walked $\frac{41}{8}$; Bill $\frac{31}{8}$; Tom $\frac{32}{8}$ and Fred $\frac{25}{8}$. How many miles did each walk?

6. Ned and David borrowed 4 dollars to use as change at their movie show. One-half of it was in dimes and one-half in nickels. How many dimes and how many nickels did they have?

7. When the movie was over the boys had 9 half dollars, 17 quarters and 11 dimes. How much money did they have?

MARY'S CAKE

One day at recess Mary said, "Girls, this is my birthday. I will divide my big cocoanut cake equally with any of you who come to play with me after school."

Three of the girls went home with Mary who cut her cake into four large pieces. Each piece was $\frac{1}{4}$ of the whole cake.

Then four more girls came and Mary cut each piece into two pieces. Each piece was $\frac{1}{8}$ of the cake.

Just then eight more girls come running in. Sixteen girls to eat one cake! Mary once more cut each piece into two pieces and now each piece was only $\frac{1}{16}$ of the whole cake. The pieces looked very small to the hungry children who ate them up at once.

The denominator of the fraction $\frac{1}{8}$ is larger than the denominator of the fraction $\frac{1}{4}$.

When each piece was $\frac{1}{4}$ of the cake, were the pieces larger or smaller than when each piece was $\frac{1}{8}$ of the cake?

The denominator of the fraction $\frac{1}{16}$ is larger than the denominator of the fraction $\frac{1}{8}$.

When each piece was $\frac{1}{8}$ of the cake, were the pieces larger or smaller than when each piece was $\frac{1}{16}$ of the cake?

Remember: The denominator shows into how many equal parts a unit has been divided. The more parts the denominator shows there are, the smaller each part must be.

Which is larger? $\frac{1}{3}$ or $\frac{1}{6}$; $\frac{1}{16}$ or $\frac{1}{32}$; $\frac{1}{6}$ or $\frac{1}{12}$

CHANGING A FRACTION TO HIGHER TERMS

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</table>

Study the drawing and see if it is true that:

$\frac{1}{2}=\frac{2}{4}$ $\frac{1}{2}=\frac{4}{8}$ $\frac{1}{2}=\frac{8}{16}$ $\frac{1}{2}=\frac{2}{4}=\frac{4}{8}=\frac{8}{16}$

You see that a fraction can be written in different ways without changing its value.

In the fraction $\frac{2}{4}$, the denominator is twice as large as the denominator in the fraction $\frac{1}{2}$. To change $\frac{1}{2}$ to $\frac{2}{4}$, multiply both terms of $\frac{1}{2}$ by 2. $\frac{1\times 2}{2\times 2}=\frac{2}{4}$

In the fraction $\frac{4}{8}$, the denominator is four times as large as the denominator in the fraction $\frac{1}{2}$. To change $\frac{1}{2}$ to $\frac{4}{8}$, multiply both terms of $\frac{1}{2}$ by 4. $\frac{1\times 4}{2\times 4}=\frac{4}{8}$

In the fraction $\frac{8}{16}$, the denominator is eight times as large as the denominator in the fraction $\frac{1}{2}$. To change $\frac{1}{2}$ to $\frac{8}{16}$, multiply both terms of $\frac{1}{2}$ by 8. $\frac{1\times 8}{2\times 8}=\frac{8}{16}$

Multiplying both terms of a fraction by the same number does not change the value of the fraction.

When we *multiply* both terms of a fraction by the same number, we change the fraction to *higher terms.*

Give the missing numbers:

$\frac{1\times\quad}{4\times\quad}=\frac{2}{8}$ $\frac{1\times\quad}{4\times\quad}=\frac{4}{16}$ $\frac{1\times\quad}{8\times\quad}=\frac{2}{16}$ $\frac{1\times\quad}{2\times\quad}=\frac{16}{32}$

CHANGING A FRACTION TO HIGHER TERMS

How many sixteenths of a cake can you cut from $\frac{3}{8}$ of a cake?

$\frac{1}{8} = \frac{2}{16}$, so $\frac{3}{8} = 3 \times \frac{2}{16} = \frac{6}{16}$

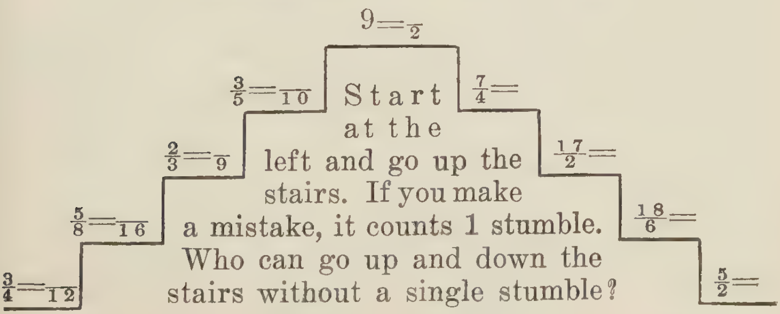
$\frac{6}{16}$ of a cake can be cut from $\frac{3}{8}$ of a cake.

How to Change a Fraction to Higher Terms

$\frac{3}{8} = \frac{}{16}$ $16 \div 8 = 2$	Divide the new denominator by the given denominator.
$\frac{3 \times 2}{8 \times 2} = \frac{6}{16}$ $\frac{3}{8} = \frac{6}{16}$	Multiply both terms of the fraction by the quotient.

1. Change to 16ths: $\frac{1}{2}$, $\frac{7}{8}$, $\frac{1}{4}$, $\frac{5}{8}$, $\frac{3}{4}$.
2. Change to 12ths: $\frac{2}{3}$, $\frac{1}{4}$, $\frac{5}{6}$, $\frac{1}{2}$, $\frac{3}{4}$.
3. Change to 24ths: $\frac{5}{8}$, $\frac{7}{12}$, $\frac{2}{3}$, $\frac{5}{6}$, $\frac{1}{2}$.
4. Change to 18ths: $\frac{1}{2}$, $\frac{5}{6}$, $\frac{2}{3}$, $\frac{2}{9}$, $\frac{5}{9}$.
5. Change to 20ths: $\frac{3}{10}$, $\frac{4}{5}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{7}{10}$.
6. Change to 32nds: $\frac{3}{8}$, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{4}$.

CLIMBING THE FRACTION STAIRS



CHANGING A FRACTION TO LOWER TERMS

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</table>

Study the drawing and see if it is true that:

$$\frac{4}{12} = \frac{1}{3} \qquad \frac{2}{6} = \frac{1}{3} \qquad \frac{4}{12} = \frac{2}{6} = \frac{1}{3}$$

You see that $\frac{1}{3}$, $\frac{2}{6}$ and $\frac{4}{12}$ have the same value though they are written in different ways.

In the fraction $\frac{2}{6}$, the denominator is twice as large as in the fraction $\frac{1}{3}$. To change $\frac{2}{6}$ to $\frac{1}{3}$, we divide both terms of the fraction $\frac{2}{6}$ by 2. $\frac{2 \div 2}{6 \div 2} = \frac{1}{3}$

In the fraction $\frac{4}{12}$, the denominator is 4 times as large as in the fraction $\frac{1}{3}$. So to change $\frac{4}{12}$ to $\frac{1}{3}$, we divide both terms of the fraction $\frac{4}{12}$ by 4. $\frac{4 \div 4}{12 \div 4} = \frac{1}{3}$

Dividing both terms of a fraction by the same number does not change the value of the fraction.

When we *divide* both terms of a fraction by the same number we change the fraction to *lower terms.*

When the numerator and the denominator of a fraction cannot be divided by any number except 1, we say that the fraction is in its *lowest terms.* $\frac{5}{8}$ is in lowest terms.

Give the missing numbers:

$\frac{2 \div \quad}{12 \div \quad} = \frac{1}{6}$ $\qquad \frac{4 \div \quad}{12 \div \quad} = \frac{2}{6}$ $\qquad \frac{8 \div \quad}{12 \div \quad} = \frac{2}{3}$ $\qquad \frac{4 \div \quad}{6 \div \quad} = \frac{2}{3}$

$\frac{10 \div 2}{12 \div 2} =$ $\qquad \frac{4 \div 2}{6 \div 2} =$ $\qquad \frac{6 \div 3}{12 \div 3} =$ $\qquad \frac{8 \div 2}{12 \div 2} =$

CHANGING A FRACTION TO LOWEST TERMS

When Tom weighed the fish he caught, the scales showed that it weighed $\frac{12}{16}$ of a pound. Tom said the fish weighed $\frac{3}{4}$ of a pound. How did he find out?

How to Change a Fraction to Lowest Terms

$\frac{12}{16} =$

$\frac{12 \div 4}{16 \div 4} = \frac{3}{4}$

Divide the numerator and the denominator of the fraction by the largest number which is exactly contained in both.

Tom found his fish weighed $\frac{3}{4}$ of a pound by changing $\frac{12}{16}$ to lowest terms.

Sometimes we may not be sure of the largest number that will divide both terms exactly. Then we must divide more than once. We might not see that 4 would divide both 12 and 16, but we might see that both numbers could be divided by 2. $\frac{12 \div 2}{16 \div 2} = \frac{6}{8}$

Then we might see that both 6 and 8 could be divided by 2. $\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$

As no number except 1 will divide both 3 and 4 exactly, we know that when $\frac{12}{16}$ has been changed to $\frac{3}{4}$, $\frac{12}{16}$ is in its lowest terms.

Change the following fractions to their lowest terms:

1.	$\frac{6}{8}$	$\frac{8}{10}$	$\frac{9}{12}$	$\frac{18}{24}$	$\frac{12}{16}$	$\frac{27}{36}$	$\frac{12}{20}$	$\frac{80}{100}$
2.	$\frac{6}{12}$	$\frac{30}{36}$	$\frac{9}{18}$	$\frac{3}{12}$	$\frac{18}{30}$	$\frac{16}{24}$	$\frac{8}{16}$	$\frac{8}{8}$
3.	$\frac{6}{10}$	$\frac{4}{12}$	$\frac{4}{10}$	$\frac{10}{18}$	$\frac{6}{24}$	$\frac{10}{16}$	$\frac{12}{24}$	$\frac{12}{18}$
4.	$\frac{16}{18}$	$\frac{10}{24}$	$\frac{14}{16}$	$\frac{18}{36}$	$\frac{10}{20}$	$\frac{6}{16}$	$\frac{5}{10}$	$\frac{8}{20}$
5.	$\frac{8}{12}$	$\frac{12}{36}$	$\frac{16}{32}$	$\frac{15}{20}$	$\frac{20}{24}$	$\frac{12}{32}$	$\frac{10}{30}$	$\frac{4}{16}$
6.	$\frac{24}{32}$	$\frac{15}{18}$	$\frac{10}{12}$	$\frac{30}{32}$	$\frac{20}{30}$	$\frac{15}{24}$	$\frac{20}{32}$	$\frac{21}{24}$

DIVIDING BY 2, 3, 5 AND 10

Here are some facts that will save you much time and work in finding what numbers will exactly divide both terms of a fraction.

2 will exactly divide any even number, that is, any number that ends with 0, 2, 4, 6 or 8.

5 will exactly divide any number that ends in 5 or 0.

10 will exactly divide any number that ends in 0.

3 will exactly divide any number if the sum of its figures can be divided by 3. Will 3 exactly divide 6921? $6+9+2+1=18$. $18 \div 3=6$.

Tell in which of these fractions both terms can be exactly divided by 2; 3; 5; 10.

$\frac{9}{24}$	$\frac{21}{27}$	$\frac{18}{20}$	$\frac{20}{36}$	$\frac{12}{18}$	$\frac{8}{20}$	$\frac{6}{18}$
$\frac{18}{24}$	$\frac{4}{16}$	$\frac{9}{12}$	$\frac{20}{25}$	$\frac{90}{100}$	$\frac{8}{10}$	$\frac{24}{32}$
$\frac{8}{12}$	$\frac{10}{15}$	$\frac{15}{25}$	$\frac{36}{40}$	$\frac{8}{18}$	$\frac{15}{32}$	$\frac{70}{100}$

Here is a fraction game. All the fractions in a column must be of equal value with the highest terms at the top and the lowest terms at the bottom as in the first column. Copy this game and fill in the squares by changing the given fractions to higher or lower terms.

$\frac{8}{16}$		$\frac{24}{36}$			$\frac{24}{40}$
$\frac{4}{8}$			$\frac{8}{12}$		
$\frac{2}{4}$				$\frac{2}{6}$	
$\frac{1}{2}$	$\frac{3}{4}$				

A Fraction Game

USING WHAT WE HAVE LEARNED

Tell which of the fractions in each group is larger:

$\frac{1}{3}$ or $\frac{1}{12}$ $\frac{3}{4}$ or $\frac{3}{8}$ $\frac{1}{8}$ or $\frac{1}{16}$ $\frac{1}{2}$ or $\frac{1}{10}$

Work these examples. Some of them tell you what to do. Change the others as you think they should be changed:

1. $5\frac{7}{8} = \frac{}{8}$	4. $\frac{7}{8} = \frac{}{24}$	7. $9 = \frac{}{4}$
2. $7 = \frac{}{6}$	5. $\frac{24}{5} =$	8. $\frac{15}{25} = —$
3. $\frac{5}{9} = \frac{}{36}$	6. $\frac{136}{4} =$	9. $36\frac{4}{5} = —$

1. What is a fraction? Name the terms of a fraction.

2. What does the numerator show? The denominator?

3. What is a proper fraction? An improper fraction? A mixed number?

4. How do you change a mixed number to an improper fraction?

5. How do you change an improper fraction to a whole or mixed number?

6. Do you change the value of a fraction when you multiply both terms by the same number? What do you mean by "changing a fraction to higher terms"? Explain how you would do it.

7. How do you change a fraction to lowest terms?

8. How can you tell without dividing whether a number can be exactly divided by 5? by 3? by 2? by 10?

FACTORS

The product of 2×5 is 10. 2 and 5 are factors of 10.

The factors of a number are those numbers which multiplied together give that number.

Find numbers of which these numbers are the factors:

5 and 7	7 and 7	11 and 2	3 and 13

The following numbers are factors of what numbers? Name other factors of the same numbers.

4 and 9	8 and 8	8 and 3	5 and 8	6 and 9
3, 4 and 5		2, 2, 5 and 7		3, 3, 2 and 5

When a number is divided by any one of its factors, there is no remainder and we say that the division is exact. The factor is called an exact divisor.

$$10 \div 5 = 2 \qquad 10 \div 2 = 5$$

A number which has no factors except itself and 1 is called a *prime number*. 5 and 2 are both prime numbers.

WORKING WITH FACTORS

Tell which of these numbers can be exactly divided by 10; 5; 3; 2. Tell which can be divided by more than one of these divisors:

771	985	1332	10353	990
828	210	1115	556	1494

In which of these fractions can both terms be exactly divided by 2; 3; 5; 10?

$\frac{3}{12}$	$\frac{16}{20}$	$\frac{15}{30}$	$\frac{40}{100}$	$\frac{18}{32}$	$\frac{10}{25}$	$\frac{9}{15}$
$\frac{9}{18}$	$\frac{24}{36}$	$\frac{12}{16}$	$\frac{30}{40}$	$\frac{21}{24}$	$\frac{5}{15}$	$\frac{60}{100}$

Of what numbers are these numbers the factors?

3 and 11	3 and 7	3 and 9	5 and 5	7 and 6

MULTIPLES

If we multiply 2 and 5, the product, 10, is called a multiple of 2 and 5.

A *multiple* of a number is a number that can be exactly divided by the given number.

21 is a multiple of both 3 and 7. Why?

Is 32 a multiple of 5? of 7? of 8? of 9? of 4? Why?

12 is a multiple of 2, 3 and 4. So is 24; 36; 48. You will find it easier to work with small multiples.

How to Find the Smallest Multiple of Two or More Numbers

See if the largest of the numbers will exactly contain each of the others.

If not, try two times the largest number, then three times the largest number. Keep on multiplying the largest number in this way until you find a multiple of the largest number which will exactly contain each of the given numbers.

Suppose the numbers are 2, 4 and 8. Which is the largest number? Will it exactly contain both 2 and 4? Then 8 is the smallest multiple of 2, 4 and 8.

Take the numbers 2, 4 and 6. Will the largest of these exactly contain both the others? No. Then multiply 6 by 2. $6 \times 2 = 12$. Will 12 exactly contain both 4 and 2? If so, 12 is the smallest multiple of 2, 4 and 6.

Find the smallest multiple of:

2, 3, 6 and 8	3, 10 and 18	3, 5 and 9	4, 6 and 12

FINDING COMMON DENOMINATORS

When two or more fractions have the same denominator this denominator is called a *common denominator.* 5 is a common denominator of the fractions $\frac{1}{5}$, $\frac{2}{5}$ and $\frac{3}{5}$.

Fractions that have different denominators can be changed to fractions with a common denominator. This common denominator will be a multiple of the denominator of each of the fractions.

When a common denominator of two or more fractions is the smallest multiple that will exactly contain the denominators of the fractions, it is called the *least common denominator.* L. C. D. stands for *least common denominator.*

Change the fractions $\frac{1}{2}$, $\frac{2}{3}$ and $\frac{3}{4}$ to fractions having the least common denominator.

How to Change Unlike Fractions to Fractions Having the Least Common Denominator

Change $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$ to 12ths, the least common denominator.	Find the least common denominator—the smallest multiple of the denominators.
$12 \div 2 = 6 \quad \frac{1 \times 6}{2 \times 6} = \frac{6}{12}$	Divide this denominator by the denominator of each fraction in turn.
$12 \div 3 = 4 \quad \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$	
$12 \div 4 = 3 \quad \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$	Then multiply both terms of the fraction by the quotient.

Change the fractions of each of these groups to fractions having the least common denominator:

1.	$\frac{1}{2}, \frac{1}{3}, \frac{1}{12}$	$\frac{1}{3}, \frac{1}{6}, \frac{2}{9}$	$\frac{1}{4}, \frac{3}{8}, \frac{7}{16}$
2.	$\frac{1}{4}, \frac{3}{8}, \frac{4}{12}$	$\frac{1}{2}, \frac{1}{6}, \frac{5}{12}$	$\frac{2}{3}, \frac{5}{6}, \frac{5}{18}$
3.	$\frac{1}{2}, \frac{3}{7}, \frac{1}{14}$	$\frac{1}{2}, \frac{3}{4}, \frac{5}{8}$	$\frac{2}{3}, \frac{1}{6}, \frac{3}{8}$

A FRACTION TEST

Change each of these numbers to halves; thirds; sixths; twelfths, and fifths:

5 1 12 30 6 13 3 24

Change these mixed numbers to improper fractions:

1. $1\frac{1}{3}$ $6\frac{7}{16}$ $9\frac{3}{8}$ $1\frac{15}{16}$ $5\frac{7}{8}$ $7\frac{3}{10}$ $15\frac{1}{6}$
2. $3\frac{7}{12}$ $17\frac{4}{5}$ $11\frac{1}{8}$ $2\frac{11}{12}$ $4\frac{3}{16}$ $13\frac{3}{4}$ $19\frac{1}{2}$

Change these fractions to whole or mixed numbers:

$\frac{5}{4}$ $\frac{17}{16}$ $\frac{24}{3}$ $\frac{72}{12}$ $\frac{34}{8}$ $\frac{44}{10}$ $\frac{57}{9}$ $\frac{64}{8}$

Tell which is larger:

$\frac{1}{3}$ or $\frac{1}{9}$ $\frac{1}{8}$ or $\frac{1}{32}$ $\frac{1}{6}$ or $\frac{1}{10}$ $\frac{1}{2}$ or $\frac{1}{4}$

$\frac{1}{4}$ or $\frac{1}{16}$ $\frac{1}{4}$ or $\frac{1}{12}$ $\frac{1}{5}$ or $\frac{1}{15}$ $\frac{1}{8}$ or $\frac{1}{12}$

Change each of these fractions to 16ths:

$\frac{1}{2}$ $\frac{7}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{3}{4}$ $\frac{5}{8}$

Change each of these fractions to 24ths:

$\frac{1}{3}$ $\frac{1}{6}$ $\frac{1}{12}$ $\frac{11}{12}$ $\frac{5}{6}$ $\frac{2}{3}$ $\frac{7}{12}$ $\frac{5}{12}$

Change each of these fractions to their lowest terms:

$\frac{27}{30}$ $\frac{96}{100}$ $\frac{12}{18}$ $\frac{14}{16}$ $\frac{12}{20}$ $\frac{10}{12}$ $\frac{12}{24}$ $\frac{25}{100}$

Change the fractions of each of these groups to fractions with a least common denominator:

1. $\frac{1}{12}, \frac{1}{8}, \frac{1}{4}$ $\frac{5}{12}, \frac{2}{3}, \frac{5}{4}$ $\frac{1}{4}, \frac{1}{5}, \frac{1}{2}$
2. $\frac{3}{5}, \frac{3}{4}, \frac{7}{10}$ $\frac{1}{8}, \frac{3}{4}, \frac{1}{2}$ $\frac{3}{8}, \frac{7}{12}, \frac{1}{6}$

ADDING LIKE FRACTIONS

The fractions $\frac{1}{5}$, $\frac{3}{5}$ and $\frac{4}{5}$ have the same denominator.

Fractions that have the same denominator are called *like fractions.*

The fractions $\frac{2}{3}$, $\frac{4}{5}$ and $\frac{5}{6}$ have different denominators.

Fractions that have different denominators are called *unlike fractions.*

We have learned that we can add things of the same kind. We can add \$3 and \$2. We can add 3 pecks and 2 pecks. We can add $\frac{2}{4}$ and $\frac{1}{4}$.

We can add all like fractions such as halves, or fourths, or eighths. See how these fractions are added:

$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{3}$
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{2}{5}$	$\frac{2}{3}$
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{5}{8}$	$\frac{3}{5}$	$\frac{1}{3}$
$\frac{3}{2}$ or $1\frac{1}{2}$	$\frac{4}{4}$ or 1	$\frac{9}{8}$ or $1\frac{1}{8}$	$\frac{6}{5}$ or $1\frac{1}{5}$	$\frac{4}{3}$ or $1\frac{1}{3}$

1. Add these fractions. When the answer equals a whole number, write the whole number. Be sure that all answers are in lowest terms:

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{3}{5}$	$\frac{1}{6}$	$\frac{1}{8}$
$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{6}$	$\frac{5}{8}$

2. Give the sums. Write each in its lowest terms:

$\frac{3}{8}$	$\frac{1}{8}$	$\frac{2}{4}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{2}{8}$	$\frac{7}{8}$	$\frac{4}{5}$
$\frac{2}{8}$	$\frac{3}{8}$	$\frac{2}{4}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{1}{8}$	$\frac{1}{5}$

$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{3}{8}$
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{2}{4}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{2}{8}$
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{4}{8}$	$\frac{3}{8}$

ADDING WHEN FRACTIONS ARE UNLIKE

Before we can add unlike fractions we must change them to fractions that have a common denominator.

Alice spent $\frac{1}{3}$ of an hour at breakfast. After breakfast she practiced for $\frac{1}{2}$ hour. Then she played tennis for $\frac{3}{4}$ of an hour. How long did all these things take?

The smallest number that will exactly contain the denominators 3, 2 and 4 is 12.

$12 \div 3 = 4$. Multiply both terms of $\frac{1}{3}$ by 4. $\frac{1 \times 4}{3 \times 4} = \frac{4}{12}$

$12 \div 2 = 6$. Multiply both terms of $\frac{1}{2}$ by 6. $\frac{1 \times 6}{2 \times 6} = \frac{6}{12}$

$12 \div 4 = 3$. Multiply both terms of $\frac{3}{4}$ by 3. $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

$\frac{19}{12} = 1\frac{7}{12}$

When all the fractions have been made into like fractions, we add. Alice was busy $1\frac{7}{12}$ hours.

How to Find the Sum of Unlike Fractions

$\frac{1}{3} + \frac{1}{2} + \frac{3}{4} =$

$\frac{1}{3} = \frac{4}{12}$

$\frac{1}{2} = \frac{6}{12}$

$\frac{3}{4} = \frac{9}{12}$

$\frac{19}{12} = 1\frac{7}{12}$

Change the fractions to fractions having the least common denominator.

Add their numerators. Place the sum over the least common denominator.

If the answer is an improper fraction, change it to a whole or mixed number.

Add these fractions.

1.	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{1}{2}$
	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{5}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$
2.	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{2}{6}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{3}$
	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{3}{12}$

USING FRACTIONS IN PROBLEMS

1. George gathered $\frac{1}{4}$ of a peck of chestnuts and his brother gathered $\frac{3}{8}$ of a peck. What part of a peck did both gather?

2. To reach the football field James walked $\frac{1}{2}$ of a mile and then rode $\frac{3}{4}$ of a mile on the trolley. How far did he have to go to reach the field?

3. John had $\frac{1}{2}$ of a dollar to spend and his two chums each had $\frac{1}{4}$ of a dollar. How much did the three have?

4. Find the length of $\frac{1}{2}$ of a foot and $\frac{1}{3}$ of a foot.

5. The grocer sold $\frac{3}{4}$ of a peck of potatoes to one customer, and $\frac{1}{8}$ of a peck to another. What part of a peck did he sell to both?

6. Kate has $\frac{5}{8}$ of a pound of candy and her brother has $\frac{3}{4}$ of a pound. How much candy have both?

7. Fred caught 2 fish. One weighed $\frac{7}{8}$ of a pound. The other weighed $\frac{3}{4}$ of a pound. How much did both weigh?

8. David planted $\frac{1}{3}$ of his garden one week and $\frac{1}{8}$ of it the next week. What part of his garden did he plant in the two weeks?

9. George walked $\frac{2}{3}$ of a mile in the morning, $\frac{3}{8}$ of a mile in the afternoon and $\frac{1}{4}$ of a mile in the evening. How far did he walk that day?

10. Fred lives $\frac{3}{4}$ of a mile from school. His chum lives $\frac{3}{8}$ of a mile farther from the school. How far does Fred's chum live from the school?

11. Alice spent $\frac{2}{5}$ of her vacation visiting her cousin and $\frac{1}{3}$ of it at a girls' camp. What part of her whole vacation did she spend at the two places?

ADDING MIXED NUMBERS

Three boys went camping. The first boy took $3\frac{1}{4}$ pounds of food, the second took $2\frac{1}{2}$ pounds and the third took $3\frac{3}{4}$ pounds. How much did all of the food weigh?

How to Add Mixed Numbers

$$3\tfrac{1}{4} + 2\tfrac{1}{2} + 3\tfrac{3}{4} =$$

$$\begin{aligned} 3\tfrac{1}{4} &= 3\tfrac{1}{4} \\ 2\tfrac{1}{2} &= 2\tfrac{2}{4} \\ 3\tfrac{3}{4} &= 3\tfrac{3}{4} \\ \hline & 9\tfrac{2}{4} = 9\tfrac{1}{2} \end{aligned}$$

Change the fractions to fractions having a least common denominator, and add.

If their sum is an improper fraction, change it to a mixed number.

Write the fraction and carry the whole number to add to the other whole numbers.

The food weighed $9\frac{1}{2}$ pounds.

Find the sums:

1.	$5\frac{1}{8}$	$1\frac{3}{4}$	$1\frac{3}{8}$	$3\frac{7}{8}$	$6\frac{3}{8}$	$4\frac{5}{8}$	$2\frac{7}{8}$	
	$3\frac{7}{8}$	$2\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{5}{8}$	$5\frac{7}{8}$	
2.	$9\frac{3}{4}$	$8\frac{4}{5}$	$6\frac{2}{3}$	$9\frac{5}{6}$	$7\frac{7}{10}$	$8\frac{7}{12}$	$9\frac{4}{9}$	$8\frac{7}{10}$
	$6\frac{1}{2}$	$7\frac{3}{4}$	$5\frac{7}{8}$	$8\frac{4}{9}$	$6\frac{3}{4}$	$5\frac{2}{3}$	$9\frac{7}{12}$	$\frac{4}{5}$

3. $4\frac{1}{2} + 2\frac{1}{3} + 3\frac{1}{4}$ 5. $8\frac{1}{3} + 7\frac{3}{8} + 4\frac{5}{6}$ 7. $1\frac{5}{9} + 8\frac{3}{4} + 6\frac{7}{12}$

4. $4\frac{3}{4} + 5\frac{5}{6} + 2\frac{7}{12}$ 6. $1\frac{1}{2} + 2\frac{1}{3} + \frac{5}{8}$ 8. $3\frac{2}{3} + 6\frac{4}{5} + 8\frac{1}{2}$

1. Nancy's father brought home a two-pound box of candy. The first day the family ate $\frac{3}{8}$ of a pound, the second day $\frac{1}{4}$ of a pound and the third day, $1\frac{1}{8}$ pounds. How much was eaten in the three days?

2. Julia walked $1\frac{1}{8}$ miles to play tennis. She came home by a short cut, $\frac{2}{3}$ of a mile long. How many miles did she walk in going and coming?

EVERYDAY USES OF MIXED NUMBERS

1. A farmer sold butter to city customers each week. Here is the record of his July sales:

	1st wk. lb.	2nd wk. lb.	3rd wk. lb.	4th wk. lb.
Mrs. Lee	2	$2\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{1}{2}$
Mrs. Ray	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$1\frac{1}{4}$
Mrs. Stone	$2\frac{1}{4}$	3	$1\frac{3}{4}$	$2\frac{3}{4}$
Mrs. Black	3	$2\frac{3}{4}$	$2\frac{1}{4}$	3
Mrs. Willis	$1\frac{3}{4}$	$1\frac{1}{2}$	3	$1\frac{1}{4}$

How many pounds did the farmer sell to his customers each week in July?

How many pounds did the farmer sell to each customer, during the month?

How many pounds did he sell in all?

2. Tom delivers meat for a butcher Saturday mornings. Find the total weight of each of these meat orders:

1st order lb.	2nd order lb.	3rd order lb.	4th order lb.	5th order lb.
$2\frac{1}{2}$	$2\frac{3}{8}$	$1\frac{5}{8}$	$2\frac{3}{4}$	$4\frac{7}{8}$
$1\frac{3}{4}$	$3\frac{3}{4}$	$2\frac{1}{8}$	3	$1\frac{3}{4}$
		$3\frac{3}{4}$	$4\frac{5}{8}$	$2\frac{3}{8}$

3. A coal dealer delivered 5 loads of coal. Here are the weights: $3\frac{1}{4}$ tons, $1\frac{3}{4}$ tons, $2\frac{1}{2}$ tons, $2\frac{5}{8}$ tons, and 4 tons. How much did all weigh?

4. Last summer Bob motored to Chicago. Monday he traveled $150\frac{1}{5}$ miles, Tuesday $130\frac{3}{10}$ miles, Wednesday $170\frac{3}{5}$ miles, Thursday $140\frac{7}{10}$ miles, Friday $111\frac{4}{5}$ miles. How many miles did he travel?

SUBTRACTING LIKE FRACTIONS

Mrs. Brown had $\frac{3}{4}$ of a pie and gave $\frac{1}{4}$ of the whole pie to Alice. What part of the pie did she have left?

How to Subtract Like Fractions

$\frac{3}{4} - \frac{1}{4} =$	Write the smaller fraction under the larger and subtract the numerators. Place the difference over the common denominator.
$\frac{3}{4}$ $\frac{1}{4}$	Change to lowest terms.
$\frac{2}{4} = \frac{1}{2}$	Mrs. Brown had $\frac{1}{2}$ of the pie left.

Subtract these fractions:

$\frac{2}{4}$	$\frac{4}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{6}{8}$	$\frac{4}{5}$	$\frac{2}{6}$
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{4}{8}$	$\frac{2}{8}$	$\frac{2}{4}$	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{6}$
$\frac{3}{4}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{6}{8}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{6}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
$\frac{1}{4}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{1}{8}$
$\frac{5}{6}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{4}{6}$	$\frac{5}{9}$	$\frac{8}{9}$	$\frac{7}{9}$	$\frac{6}{9}$
$\frac{2}{6}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{2}{9}$	$\frac{4}{9}$	$\frac{3}{9}$	$\frac{2}{9}$

1. If you bought $\frac{3}{4}$ of a pound of crackers and ate $\frac{1}{4}$ of a pound on the way home from the store, what part of a pound would you have when you reached home?

2. When Paul went fishing, he rowed his boat $\frac{3}{8}$ of a mile. The wind drifted his boat, so that he had to row $\frac{5}{8}$ of a mile to get back to camp. How much farther did he row in going back to camp?

3. Paul caught a perch that weighed $\frac{11}{16}$ of a pound and another that weighed $\frac{9}{16}$ of a pound. What is the difference between their weights?

SUBTRACTING WHEN FRACTIONS ARE UNLIKE

Mrs. Wolfe had $\frac{5}{6}$ of a bushel of potatoes. After she had used $\frac{1}{3}$ of a bushel, what part of a bushel was left?

How to Subtract When Fractions Are Unlike

$$\frac{5}{6} - \frac{1}{3} =$$

$$\begin{array}{r} \frac{5}{6} = \frac{5}{6} \\ \frac{1}{3} = \underline{\frac{2}{6}} \\ \frac{3}{6} = \frac{1}{2} \end{array}$$

Change the fractions to fractions having a common denominator. Subtract the numerators.

Place the difference over the common denominator. Reduce to lowest terms.

Mrs. Wolfe had $\frac{1}{2}$ of a bushel of potatoes left.

Subtract:

1.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{9}{10}$
	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{2}{5}$	$\frac{3}{4}$
2.	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{1}{2}$	$\frac{7}{10}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{7}{12}$
	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{8}$	$\frac{1}{2}$

SUBTRACTING A WHOLE NUMBER FROM A MIXED NUMBER

Charlotte had $2\frac{3}{4}$ cups of milk. She used 1 cup in making a cake. How much milk did she have left?

How to Subtract a Whole Number from a Mixed Number

$$2\frac{3}{4} - 1 =$$

$$\begin{array}{l} 2\frac{3}{4} \\ \underline{1} \\ 1\frac{3}{4} \end{array}$$

Bring down the fraction.

Subtract the whole numbers.

Charlotte had $1\frac{3}{4}$ cups of milk left.

Subtract:

$2\frac{7}{8}$	$4\frac{3}{5}$	$1\frac{2}{3}$	$6\frac{1}{6}$	$5\frac{5}{6}$	$9\frac{1}{7}$
1	2	1	3	2	4

USING FRACTIONS IN PROBLEMS

1. Dan earned $\frac{3}{4}$ of a dollar and spent $\frac{1}{2}$ of a dollar for a bat. What part of a dollar did he have left?

2. Lucy has $\frac{3}{4}$ of a yard of gingham to make an apron. She needs $\frac{7}{8}$ of a yard. How much more does she need?

3. Frank walks $\frac{3}{4}$ of a mile to school. Jack walks $\frac{5}{8}$ of a mile. How much farther does Frank walk than Jack?

4. A clerk was weighing $1\frac{1}{2}$ pounds of candy for a customer. After she had put $\frac{3}{4}$ of a pound in a box, how much more did she need to make $1\frac{1}{2}$ pounds?

5. Nell's mother gave her $\frac{7}{8}$ of a yard of silk. She used $\frac{1}{2}$ yard for her doll's dress. How much silk did she have left? She needed $\frac{1}{4}$ of a yard of silk for her doll's coat. Did she have enough silk left to make the coat?

6. How much more than $\frac{1}{2}$ of a pound does $\frac{5}{8}$ of a pound of candy weigh?

7. $\frac{1}{2}$ of a mile is how much longer than $\frac{3}{8}$ of a mile?

8. $\frac{1}{4}$ of a mile is how much shorter than $\frac{5}{8}$ of a mile?

9. Mrs. Williams had a bar of chocolate that weighed $\frac{3}{4}$ of a pound. She used $\frac{1}{8}$ of a pound for a cake. How much chocolate did she have left?

10. Ned's house was $\frac{7}{8}$ of a mile from school. After he had walked $\frac{1}{4}$ of a mile, how much farther did he have to go?

11. Helen bought $\frac{3}{4}$ of a yard of orange paper to make some poppies. When she had used $\frac{1}{6}$ of a yard, how much had she left?

12. The sum of two numbers is $\frac{7}{8}$. One of the numbers is $\frac{1}{2}$. What is the other?

13. Martha had a piece of ribbon that was $\frac{7}{8}$ of a yard long. She used $\frac{1}{3}$ of a yard for trimming a doll's hat. What part of a yard did she have left?

14. The largest fish Bill caught weighed $\frac{3}{4}$ of a pound and the smallest weighed $\frac{3}{8}$ of a pound. What was the difference in weight?

15. John started out to walk $\frac{2}{3}$ of a mile. After he had walked $\frac{1}{2}$ of a mile, what part of a mile did he still have to walk?

16. In going to the point Harry rowed $\frac{1}{2}$ a mile and his sister $\frac{1}{6}$ of a mile. How much farther did Harry row than his sister?

17. William asked the clerk for $\frac{1}{2}$ of a pound of cheese. The clerk cut off a piece that weighed $\frac{7}{8}$ of a pound. How much too heavy was it?

18. Sam has $\frac{5}{6}$ of a pound of candy. Bill has $\frac{3}{4}$ of a pound. How much more has Sam than Bill?

19. It took Dan $\frac{5}{6}$ of an hour to walk to school. He bought a bicycle and found that he could ride to school in $\frac{1}{3}$ of an hour. Find the difference in time.

20. Kate bought $\frac{2}{3}$ of a yard of ribbon and used $\frac{1}{4}$ of it. How much did she have left?

21. Last month Mrs. Small used $\frac{2}{5}$ of a ton of coal in the range and $\frac{3}{4}$ of a ton in the furnace. How much more coal did she use in the furnace than in the range?

22. A man used $\frac{1}{3}$ of his salary for rent and $\frac{4}{9}$ of it for food and clothes. How much more did he spend for food and clothes than for rent?

HOW TO SUBTRACT MIXED NUMBERS

1.

A carpenter sawed a piece of board that was $6\frac{1}{4}$ feet long from a board that was $9\frac{1}{2}$ feet long. How long was the piece that was left?

$9\frac{1}{2} - 6\frac{1}{4} =$	Change the fractions to fractions having a common denominator.
$9\frac{1}{2} = 9\frac{2}{4}$ $6\frac{1}{4} = 6\frac{1}{4}$ $\overline{3\frac{1}{4}}$	Subtract the fractions, then subtract the whole numbers. The piece left was $3\frac{1}{4}$ feet long.

2.

A grocer who had 6 barrels of sugar sold $2\frac{1}{4}$ barrels. How much did he have left?

$6 \quad - 2\frac{1}{4} =$	You have no fraction in the minuend, so change 6 to $5\frac{4}{4}$. Subtract.
$6 \quad = 5\frac{4}{4}$ $2\frac{1}{4} = 2\frac{1}{4}$ $\overline{3\frac{3}{4}}$	The grocer had $3\frac{3}{4}$ barrels left.

3.

A fruit dealer who had $8\frac{1}{4}$ dozen oranges sold $4\frac{1}{2}$ dozen. How many dozen did he have left?

$8\frac{1}{4} - 4\frac{1}{2} =$	You cannot subtract $\frac{1}{2}$ or $\frac{2}{4}$ from $\frac{1}{4}$. $8 = 7\frac{4}{4}$ $\qquad$ $8\frac{1}{4} = 7\frac{5}{4}$
$8\frac{1}{4} = 7\frac{5}{4}$ $4\frac{1}{2} = 4\frac{2}{4}$ $\overline{3\frac{3}{4}}$	Subtract the fractions. Then subtract the whole numbers. The fruit dealer had $3\frac{3}{4}$ dozen left.

Copy and subtract:

1.	$3\frac{1}{8}$	$8\frac{1}{4}$	4	$5\frac{3}{8}$	$7\frac{3}{8}$	$9\frac{1}{8}$	$6\frac{5}{8}$
	$1\frac{1}{4}$	$5\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{1}{2}$	$3\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{3}{4}$
2.	$6\frac{3}{8}$	$5\frac{1}{2}$	$9\frac{1}{4}$	$7\frac{3}{4}$	8	$6\frac{1}{4}$	$9\frac{1}{2}$
	$1\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{5}{8}$	$4\frac{7}{8}$	$2\frac{5}{8}$	$4\frac{7}{8}$	$2\frac{7}{8}$
3.	$5\frac{1}{10}$	$9\frac{1}{3}$	7	$16\frac{1}{6}$	$7\frac{1}{2}$	$10\frac{7}{12}$	15
	$2\frac{3}{5}$	$6\frac{5}{12}$	$3\frac{5}{6}$	$8\frac{3}{4}$	$3\frac{5}{6}$	$2\frac{5}{8}$	$9\frac{11}{12}$
4.	$8\frac{5}{12}$	$9\frac{11}{16}$	$14\frac{1}{4}$	6	$18\frac{3}{4}$	$4\frac{7}{20}$	$17\frac{2}{9}$
	$7\frac{5}{8}$	$3\frac{3}{4}$	$5\frac{2}{3}$	$4\frac{3}{16}$	$9\frac{2}{3}$	$2\frac{3}{5}$	$7\frac{5}{6}$

USING MIXED NUMBERS IN PROBLEMS

1. The butcher had a ham that weighed $9\frac{3}{4}$ pounds. How much did it weigh after he had sold $3\frac{1}{2}$ pounds?

2. May was given $2\frac{1}{2}$ pounds of candy on her birthday. She gave $1\frac{1}{4}$ pounds to her brothers. How many pounds did she have left?

3. Jennie has $6\frac{3}{4}$ yards of ribbon. She needs $9\frac{1}{2}$ yards for trimming a dress. How many yards does she lack?

4. A tailor bought 42 yards of cloth to make men's suits. He used $3\frac{1}{4}$ yards for one suit and $3\frac{2}{3}$ yards for another. How many yards did he have left?

5. With his overcoat on Fred weighs $98\frac{1}{2}$ pounds. The overcoat weighs $6\frac{3}{4}$ pounds. How much does Fred weigh without his overcoat?

6. A dealer had a carload of coal that weighed 40 tons. How many tons were left after he had sold $8\frac{1}{2}$ tons to one family and $12\frac{3}{4}$ tons to another?

MULTIPLYING FRACTIONS

Anne lives $\frac{3}{8}$ of a mile from school. Polly's home is 3 times as far away. How far does Polly live from school?

How to Multiply a Fraction by a Whole Number

$3 \times \frac{3}{8} =$	Multiply the numerator by the whole number and place the product over the denominator.
$3 \times \frac{3}{8} = \frac{9}{8}$	Change the result to a whole or mixed number.
$\frac{9}{8} = 1\frac{1}{8}$	Polly lives $1\frac{1}{8}$ miles from school.

Copy and multiply:

1. $\frac{3}{4} \times 3$	7. $\frac{3}{8} \times 11$	13. $21 \times \frac{7}{12}$	19. $19 \times \frac{7}{8}$
2. $\frac{7}{8} \times 9$	8. $\frac{2}{5} \times 8$	14. $12 \times \frac{3}{5}$	20. $14 \times \frac{3}{5}$
3. $\frac{4}{8} \times 5$	9. $\frac{7}{8} \times 13$	15. $19 \times \frac{7}{10}$	21. $\frac{3}{10} \times 13$
4. $\frac{1}{2} \times 7$	10. $\frac{7}{12} \times 13$	16. $17 \times \frac{5}{12}$	22. $\frac{7}{12} \times 35$
5. $\frac{5}{9} \times 4$	11. $15 \times \frac{3}{16}$	17. $29 \times \frac{7}{20}$	23. $\frac{3}{16} \times 25$
6. $\frac{2}{3} \times 8$	12. $21 \times \frac{1}{4}$	18. $17 \times \frac{4}{5}$	24. $\frac{9}{10} \times 29$

1. A recipe for gingerbread called for $\frac{3}{4}$ cup of molasses. If Molly made 3 times the recipe, how much molasses did she use?

2. Each pupil in a class of 43 used $\frac{1}{3}$ of a sheet of drawing paper to make a calendar. How much paper did the class use in all?

3. I live $\frac{3}{4}$ of a mile from school. How far do I walk in 5 days, going and coming?

A CAMPING TRIP

1. Joe, Paul, Howard and I went on a camping trip. Each of us carried $\frac{1}{4}$ of the supplies which weighed 68 pounds. How much did each carry?

2. One day we caught 48 fish. We fried $\frac{3}{8}$ of them for supper. How many did we have left?

3. The summit of Bear Mountain is $\frac{3}{5}$ mile above sea level. If there are 5280 feet in a mile, how many feet above sea level were we when we had climbed to the top?

4. Paul used some canvas to mend the sail on his boat. He used one piece $\frac{1}{6}$ of a yard long and another $\frac{3}{4}$ of a yard long. How many inches of canvas did he use if there are 36 inches in a yard?

5. Howard swam $\frac{1}{4}$ of a mile one day. There are 5280 feet in a mile. How many feet did he swim? How many yards?

6. On the way home we went $\frac{1}{2}$ of the way on the train, $\frac{1}{3}$ of the way on a boat and hiked the rest of the way. The whole distance was 54 miles. How far did we hike?

CANCELING

Before multiplying fractions it is easier to cancel the common factors in the numerators and denominators. To do this, divide one numerator and one denominator by a number which will exactly divide them both.

When you multiply a fraction by a whole number, the whole number *may* be written as the numerator of a fraction with 1 as the denominator.

$\frac{9}{1}$ is an improper fraction. Dividing the numerator by the denominator shows you that $\frac{9}{1} = 9 \div 1 = 9$. $\frac{9}{1} = 9$.

It took $\frac{5}{6}$ of a yard of cloth to make one laundry bag. How much would be needed for 9 bags?

$9 \times \frac{5}{6} =$

$$9 \times \frac{5}{6} = \frac{\overset{3}{\cancel{9}}}{1} \times \frac{5}{\underset{2}{\cancel{6}}} = \frac{15}{2} = 7\frac{1}{2}$$

3 is a factor of both 9 in the numerator, and 6 in the denominator. Divide 9 and 6 by 3.

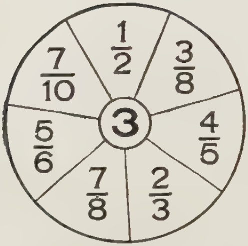
Then multiply the numerators together for a new numerator and the denominators together for a new denominator. Change the result to a whole or a mixed number if possible.

$7\frac{1}{2}$ yards would be needed to make 9 bags.

Find the products, using cancellation:

1.	$6 \times \frac{2}{3}$	$\frac{5}{6} \times 9$	$40 \times \frac{3}{8}$	$\frac{7}{8} \times 8$
2.	$18 \times \frac{7}{9}$	$\frac{3}{8} \times 12$	$56 \times \frac{9}{16}$	$9 \times \frac{1}{9}$
3.	$24 \times \frac{5}{6}$	$\frac{7}{9} \times 24$	$\frac{3}{10} \times 15$	$\frac{5}{8} \times 64$
4.	$5 \times \frac{1}{5}$	$\frac{5}{12} \times 30$	$\frac{7}{10} \times 55$	$\frac{7}{12} \times 56$

A WHEEL DRILL



Here is a fraction wheel. Multiply the fractions around the wheel by the number in the center.

Change the number in the center for added practice.

Remember: In multiplying fractions *of* means *times.*

1. $\frac{3}{4}$ of $12 =$	$\frac{7}{8}$ of $16 =$	$\frac{3}{5} \times 25 =$
2. $\frac{2}{5} \times 20 =$	$\frac{3}{4} \times 36 =$	$\frac{7}{8}$ of $56 =$
3. $\frac{4}{9}$ of $36 =$	$\frac{2}{3} \times 17 =$	$\frac{5}{16}$ of $28 =$
4. $\frac{5}{6} \times 16 =$	$\frac{7}{12}$ of $42 =$	$\frac{5}{7} \times 40 =$

PROBLEMS

1. If there are 12 city blocks in a mile, how many are there in $\frac{5}{6}$ of a mile?

2. We picked 10 quarts of strawberries and sold $\frac{4}{5}$ of them. How many quarts did we sell?

3. A farmer's wife gathered 16 eggs. She used $\frac{3}{8}$ of them in cooking. How many did she have left?

4. There are 27 chapters in the book Ruth is reading. If she has read $\frac{2}{3}$ of the 27 chapters, how many more has she to read?

5. Robert saved \$20. He put $\frac{3}{4}$ of the money in the bank and spent the rest. How much did he spend?

6. There are 60 children at the ball game. $\frac{2}{5}$ of them are girls. How many girls are there? How many more boys than girls?

MULTIPLYING A FRACTION BY A FRACTION

Frank lives $\frac{4}{5}$ of a mile from the swimming pool and James lives $\frac{2}{3}$ of that distance from the pool. How far does James live from the pool?

How to Multiply a Fraction by a Fraction

$\frac{2}{3}$ of $\frac{4}{5} =$

$\frac{2}{3}$ of $\frac{4}{5} = \frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$

Multiply the numerators together for a new numerator and the denominators together for a new denominator.

James lives $\frac{8}{15}$ of a mile from the swimming pool.

CANCELING IN MULTIPLYING FRACTIONS

$\frac{7}{24}$ of $\frac{9}{21} =$

$$\dfrac{\overset{1}{\cancel{7}}}{\underset{8}{\cancel{24}}} \times \dfrac{\overset{\overset{1}{\cancel{3}}}{\cancel{9}}}{\underset{\underset{1}{\cancel{3}}}{\cancel{21}}} = \frac{1}{8}$$

Cancel the factor 3 from 9 and 24.
Cancel the factor 7 from 7 and 21.
Cancel the factor 3 from 3 and 3.
Then multiply.

Remember: In canceling, when the quotient is 1 it need not be written.

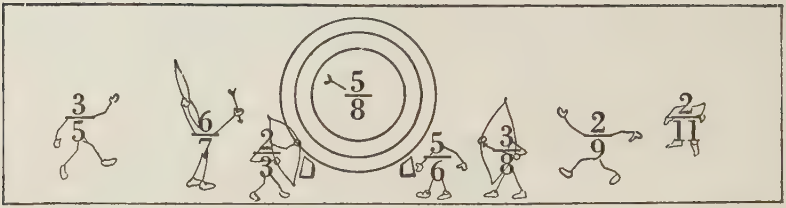
Find:

1.	$\frac{1}{2}$ of $\frac{1}{4}$	$\frac{1}{5}$ of $\frac{1}{2}$	$\frac{2}{3}$ of $\frac{3}{8}$	$\frac{1}{4}$ of $\frac{1}{4}$
2.	$\frac{1}{10}$ of $\frac{1}{4}$	$\frac{3}{4}$ of $\frac{1}{12}$	$\frac{1}{8}$ of $\frac{1}{4}$	$\frac{2}{5}$ of $\frac{1}{8}$
3.	$\frac{5}{8}$ of $\frac{3}{10}$	$\frac{1}{16}$ of $\frac{1}{4}$	$\frac{4}{5}$ of $\frac{1}{16}$	$\frac{4}{5}$ of $\frac{1}{3}$

Multiply:

1.	$\frac{2}{3} \times \frac{1}{4}$	$\frac{3}{16} \times \frac{2}{3}$	$\frac{5}{12} \times \frac{3}{8}$	$\frac{5}{6} \times \frac{1}{4}$
2.	$\frac{7}{10} \times \frac{2}{5}$	$\frac{7}{16} \times \frac{4}{5}$	$\frac{5}{12} \times \frac{1}{4}$	$\frac{5}{6} \times \frac{2}{5}$

TARGET PRACTICE



Multiply the fraction on the target by each fraction given below it. A correct answer is a bull's-eye. Each correct answer counts one. Use each of the other fractions in the target.

MULTIPLYING FRACTIONS AND MIXED NUMBERS

Mrs. Anderson used $\frac{7}{10}$ of a ton of coal each month for $2\frac{1}{2}$ months. How many tons did she use in all?

How to Multiply a Mixed Number by a Fraction

$2\frac{1}{2} \times \frac{7}{10} =$	Change the mixed number to an improper fraction.
$2\frac{1}{2} = \frac{5}{2}$	
$\frac{\cancel{5}}{2} \times \frac{7}{\underset{2}{\cancel{10}}} = \frac{7}{4} = 1\frac{3}{4}$	Cancel, if possible. Multiply the fractions.

Mrs. Anderson used $1\frac{3}{4}$ tons of coal.

Change the mixed numbers to improper fractions and multiply:

1.	$\frac{3}{4} \times 5\frac{1}{2}$	$6\frac{1}{4} \times \frac{2}{3}$	$\frac{7}{8} \times 4\frac{1}{2}$	$3\frac{1}{2} \times \frac{3}{5}$
2.	$\frac{7}{5} \times 3\frac{1}{8}$	$4\frac{7}{8} \times \frac{2}{3}$	$\frac{5}{12} \times 2\frac{2}{3}$	$6\frac{3}{4} \times \frac{1}{3}$
3.	$\frac{1}{2} \times 7\frac{2}{3}$	$2\frac{5}{8} \times \frac{1}{7}$	$\frac{1}{3} \times 5\frac{5}{8}$	$8\frac{2}{5} \times \frac{5}{6}$
4.	$\frac{5}{8} \times 1\frac{3}{4}$	$5\frac{1}{2} \times \frac{1}{6}$	$\frac{4}{5} \times 1\frac{7}{8}$	$4\frac{1}{6} \times \frac{1}{5}$

MULTIPLYING A MIXED NUMBER BY A MIXED NUMBER

Our gardener is paid $\$3\frac{1}{2}$ a day. How much is he paid after working $2\frac{1}{2}$ days?

How to Multiply a Mixed Number by a Mixed Number	
$2\frac{1}{2} \times 3\frac{1}{2} =$	Change both mixed numbers to improper fractions.
$2\frac{1}{2} = \frac{5}{2}$	
$3\frac{1}{2} = \frac{7}{2}$	Cancel, if possible.
$\frac{5}{2} \times \frac{7}{2} = \frac{35}{4} = 8\frac{3}{4}$	Multiply.
The gardener is paid $\$8\frac{3}{4}$.	

Multiply the following, using cancellation where it is possible.

1.	$1\frac{1}{2} \times 1\frac{1}{4}$	13.	$2\frac{5}{8} \times 3\frac{1}{3}$	25.	$4\frac{2}{5} \times 4\frac{1}{6}$
2.	$2\frac{1}{4} \times 3\frac{1}{4}$	14.	$3\frac{1}{3} \times 2\frac{3}{16}$	26.	$7\frac{2}{3} \times 5\frac{1}{2}$
3.	$1\frac{2}{3} \times 4\frac{1}{2}$	15.	$4\frac{3}{8} \times 2\frac{2}{7}$	27.	$14\frac{2}{3} \times 3\frac{3}{4}$
4.	$3\frac{1}{2} \times 4\frac{1}{2}$	16.	$2\frac{1}{10} \times 5\frac{1}{3}$	28.	$4\frac{1}{6} \times 3\frac{3}{7}$
5.	$1\frac{1}{8} \times 1\frac{1}{6}$	17.	$2\frac{7}{10} \times 2\frac{2}{3}$	29.	$1\frac{1}{2} \times 1\frac{1}{3}$
6.	$3\frac{1}{4} \times 3\frac{1}{2}$	18.	$5\frac{5}{8} \times 2\frac{2}{15}$	30.	$1\frac{2}{3} \times 1\frac{4}{5}$
7.	$3\frac{1}{3} \times 2\frac{3}{4}$	19.	$3\frac{3}{8} \times 1\frac{7}{9}$	31.	$2\frac{2}{5} \times 1\frac{1}{8}$
8.	$3\frac{2}{3} \times 2\frac{2}{3}$	20.	$6\frac{1}{2} \times 7\frac{1}{7}$	32.	$3\frac{1}{2} \times \frac{5}{28}$
9.	$3\frac{1}{8} \times 3\frac{1}{2}$	21.	$\frac{9}{10} \times \frac{5}{8}$	33.	$7\frac{1}{5} \times 2\frac{2}{9}$
10.	$3\frac{1}{3} \times 5\frac{5}{8}$	22.	$8\frac{1}{8} \times 3\frac{3}{5}$	34.	$4\frac{1}{2} \times 2\frac{1}{2}$
11.	$4\frac{1}{5} \times 2\frac{1}{7}$	23.	$9\frac{9}{10} \times 7\frac{3}{11}$	35.	$5\frac{5}{8} \times \frac{5}{9}$
12.	$\frac{3}{5} \times \frac{1}{4}$	24.	$4\frac{4}{9} \times 7\frac{1}{5}$	36.	$4\frac{2}{3} \times 21$

MULTIPLYING A WHOLE NUMBER BY A MIXED NUMBER

Find $\frac{3}{4}$ of 60.

$\frac{1}{4}$ of $60 = 60 \div 4 = 15$. $\frac{3}{4}$ of $60 = 3 \times 15 = 45$.

Here 60 has been divided by the denominator, 4, and then multiplied by the numerator, 3. The result is 45.

Now try another way. First multiply 60 by the numerator, 3, and then divide the product by the denominator, 4. This result, too, is 45.

In the example $26 \times \frac{2}{3}$ it is easier to multiply 26 by 2 and then divide by 3 than it is to divide 26 by 3 and then multiply by 2. Can you tell why?

You will find in multiplying whole numbers by mixed numbers it is usually easier to multiply the whole number by the numerator of the fraction first and then divide by the denominator.

Mr. White drove his automobile for $4\frac{2}{3}$ hours at the rate of 26 miles an hour. How far did he go?

How to Multiply a Whole Number by a Mixed Number

$26 \times 4\frac{2}{3} =$	Multiply the whole number by the numerator of the fraction and divide the product by the denominator.
$\begin{array}{r} 26 \\ \underline{4\frac{2}{3}} \\ 3\overline{)52} \\ \overline{17\frac{1}{3}} \\ 104 \\ \hline 121\frac{1}{3} \end{array}$	Then multiply the whole number by the whole number of the mixed number. Add.
	Mr. White went $121\frac{1}{3}$ miles.

1.	$14 \times 4\frac{3}{4}$	$22 \times 4\frac{3}{8}$	$37 \times 8\frac{4}{5}$	$28 \times 7\frac{8}{9}$
2.	$32 \times 5\frac{2}{3}$	$24 \times 7\frac{4}{5}$	$29 \times 3\frac{7}{8}$	$34 \times 6\frac{5}{7}$
3.	$35 \times 8\frac{3}{8}$	$32 \times 6\frac{2}{3}$	$8 \times 7\frac{3}{4}$	$29 \times 9\frac{2}{3}$

USING FRACTIONS IN PROBLEMS

1. Jane had $\frac{3}{4}$ of a pound of candy and gave $\frac{1}{2}$ of it to her sister. What part of a pound did she give to her sister?

2. During the winter a man who had $\frac{3}{4}$ of a ton of coal gave $\frac{1}{3}$ of all he had to a neighbor. How much coal did he give his neighbor?

3. Tom gathered $\frac{1}{3}$ of a bushel of nuts and gave $\frac{4}{5}$ of them to his sister. What part of a bushel did he give to his sister?

4. Charles has an allowance of $\frac{3}{5}$ of a dollar a week. If he saves $\frac{2}{3}$ of his allowance, what part of a dollar does he save each week?

5. Mrs. Brown bought $\frac{3}{4}$ of a dozen buns for breakfast but only $\frac{2}{3}$ of them were eaten. What part of a dozen were eaten?

6. Frank earned $\frac{4}{5}$ of a dollar by mowing lawns and spent $\frac{7}{8}$ of it for a flashlight. The flashlight cost what part of a dollar?

7. Mrs. Clark bought $\frac{1}{2}$ of a barrel of flour last month, and has used $\frac{3}{4}$ of it. What part of a barrel has she used?

8. Mark had $\frac{2}{3}$ of a dozen marbles but lost $\frac{1}{4}$ of them. What part of a dozen did he lose?

9. It takes Fred $\frac{3}{4}$ of an hour to walk to school, and it takes James $\frac{1}{2}$ as long. How long does it take James?

10. Ruth went to the store for her mother and spent $\frac{2}{5}$ of a dollar for groceries. She paid $\frac{1}{4}$ of what she spent for a box of crackers. The crackers cost what part of a dollar?

11. Dick walked $3\frac{3}{4}$ miles when he went for May flowers. Uncle Paul drove him $\frac{1}{3}$ of the way home. How far did Dick ride?

12. If Mr. Davis paid $14 a ton for his coal, how much was his coal bill for $12\frac{1}{2}$ tons?

13. Two turkeys were bought for a Thanksgiving dinner. One weighed $13\frac{3}{4}$ lb. and the other $15\frac{1}{2}$ lb. How much did the two turkeys weigh? At 56¢ a pound what did the two turkeys cost?

14. Helen's mother uses an average of $2\frac{3}{4}$ lb. of butter a week. At that rate how many pounds does she use in 4 weeks?

15. Dick's mother uses $2\frac{1}{2}$ quarts of milk each day. She asked Dick to find the amount of the milk bill for June. The milk cost 16¢ a quart. Can you tell what Dick's answer should have been?

16. If Tony buys newspapers at $1\frac{3}{4}$¢ apiece and sells them at 3¢ apiece, how much will he make on 100 papers?

17. Jean's cat eats an average of $2\frac{3}{4}$ pounds of meat a week. How much meat does he eat in a year?

18. Sam took 3 packages to the postoffice to send by parcel post. They weighed $1\frac{1}{4}$ lb., $2\frac{1}{2}$ lb. and $4\frac{1}{8}$ lb. What was the total weight of the 3 packages?

19. A wholesale dealer sold a pail of candy weighing 52 pounds. He made a profit of $\frac{3}{4}$ of a cent on each pound. How much did he make on the pail of candy?

20. Hugh took 36 pictures on his trip last summer and paid $1\frac{1}{2}$¢ apiece to have the films developed. What did he pay to have them all developed?

TEST IN ADDING FRACTIONS AND MIXED NUMBERS

1. $\frac{1}{2}+\frac{4}{5}=$ 2. $\frac{3}{4}+\frac{3}{5}=$ 3. $\frac{7}{10}+\frac{3}{5}=$ 4. $\frac{3}{8}+\frac{5}{12}=$

5. $\frac{7}{16}+\frac{3}{4}=$ 6. $\frac{7}{8}+\frac{5}{16}=$ 7. $\frac{3}{4}+\frac{5}{10}=$ 8. $\frac{5}{6}+\frac{3}{8}=$

9. $\frac{3}{8}+\frac{1}{2}+\frac{3}{4}=$ 10. $\frac{9}{10}+\frac{4}{5}+\frac{3}{4}=$ 11. $\frac{7}{12}+\frac{1}{4}+\frac{5}{8}=$

12. $4\frac{2}{3}$	13. $2\frac{7}{8}$	14. $4\frac{3}{5}$	15. $6\frac{5}{8}$	16. $4\frac{5}{12}$
$3\frac{1}{2}$	$9\frac{2}{3}$	$6\frac{1}{4}$	$9\frac{3}{4}$	$8\frac{5}{6}$
$7\frac{3}{4}$	$4\frac{3}{4}$	$5\frac{1}{2}$	$7\frac{5}{6}$	$3\frac{3}{4}$

TEST IN SUBTRACTING FRACTIONS AND MIXED NUMBERS

1. $\frac{3}{4}-\frac{3}{8}=$ 2. $\frac{3}{4}-\frac{3}{5}=$ 3. $\frac{7}{12}-\frac{3}{8}=$ 4. $\frac{5}{16}-\frac{1}{4}=$

5. $\frac{3}{10}-\frac{1}{4}=$ 6. $\frac{5}{6}-\frac{5}{12}=$ 7. $\frac{9}{10}-\frac{4}{5}=$ 8. $\frac{5}{8}-\frac{5}{16}=$

9. $\frac{3}{8}-\frac{1}{6}=$ 10. $\frac{7}{10}-\frac{1}{2}=$ 11. $\frac{2}{3}-\frac{7}{12}=$ 12. $\frac{3}{4}-\frac{5}{10}=$

13. $8\frac{1}{2}$	14. $10\frac{3}{5}$	15. $12\frac{3}{4}$	16. $9\frac{9}{10}$	17. $12\frac{5}{6}$
$5\frac{3}{8}$	$6\frac{1}{4}$	$8\frac{2}{3}$	$6\frac{3}{4}$	$4\frac{5}{12}$

TEST IN MULTIPLYING FRACTIONS AND MIXED NUMBERS

Cancel when you can.

1. $4\times\frac{2}{3}=$ 2. $\frac{3}{4}\times 6=$ 3. $\frac{5}{8}\times 3\frac{4}{5}=$

4. $\frac{1}{2}\times\frac{3}{8}=$ 5. $\frac{3}{10}\times\frac{5}{8}=$ 6. $\frac{7}{12}\times\frac{3}{4}=$

7. $\frac{5}{6}\times\frac{3}{8}=$ 8. $\frac{9}{10}\times\frac{4}{9}=$ 9. $5\frac{5}{16}\times 4\frac{4}{5}=$

10. $\frac{3}{5}\times\frac{5}{12}=$ 11. $4\frac{3}{8}\times\frac{3}{10}=$ 12. $3\frac{2}{3}\times 8\frac{2}{5}=$

13. $\frac{2}{3}\times\frac{3}{4}=$ 14. $\frac{5}{6}\times\frac{1}{2}=$ 15. $\frac{7}{8}\times\frac{5}{14}=$

16. $8\frac{3}{4}\times 2\frac{1}{10}=$ 17. $64\times 9\frac{3}{4}=$ 18. $185\times 15\frac{4}{5}=$

HOW MUCH DO I KNOW ABOUT FRACTIONS?

1. When you have an improper fraction in the answer, to what must it always be changed?

2. What is the least common denominator of $\frac{1}{2}$ and $\frac{1}{5}$?

3. How is a mixed number changed to an improper fraction?

4. What must be done before unlike fractions can be added or subtracted?

5. In the example $\frac{3}{4}$ of 12, what does the word "of" mean?

6. If you divide 15 by 4, what kind of a number is your answer?

TEST IN FRACTIONS

1. Find $\frac{1}{4}$ of 164; $\frac{2}{3}$ of 39; $\frac{7}{8}$ of 72.
2. Reduce to lowest terms: $\frac{3}{9}$, $\frac{5}{15}$, $\frac{6}{12}$, $\frac{9}{12}$, $\frac{8}{16}$.
3. Change each to twelfths: $\frac{1}{4}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{2}{3}$.
4. Change to improper fractions: $2\frac{1}{4}$, $3\frac{1}{3}$, $5\frac{1}{2}$, $12\frac{1}{2}$.
5. Change to mixed numbers: $\frac{15}{2}$, $\frac{10}{3}$, $\frac{12}{5}$, $\frac{8}{7}$, $\frac{8}{3}$.
6. Add: $\frac{1}{2}+\frac{1}{4}$; $\frac{1}{2}+\frac{1}{8}$; $\frac{1}{3}+\frac{1}{6}$; $3\frac{1}{2}+4\frac{1}{4}$; $5\frac{2}{3}+4\frac{1}{3}$.
7. Subtract: $\frac{1}{3}-\frac{1}{6}$; $\frac{7}{8}-\frac{1}{4}$; $2\frac{1}{2}-\frac{3}{4}$; $4\frac{1}{3}-\frac{5}{6}$.
8. Subtract $3\frac{1}{4}$ from $7\frac{1}{2}$; $2\frac{1}{6}$ from $11\frac{1}{3}$.
9. Find the product of $4\times\frac{3}{4}$; $2\frac{1}{2}\times 6$.
10. Find $\frac{3}{8}$ of 24; $\frac{7}{8}$ of $\frac{3}{4}$.

TESTING OUR PROGRESS

Many fifth grade pupils can do any of these six tests in 10 minutes. See if you can.

At the end of 10 minutes make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

TEST I

1. $\begin{array}{r} 7371 \\ 99 \\ 6899 \\ 889 \\ 66 \\ \underline{6888} \end{array}$

2. $\frac{4}{5} \times \frac{2}{3}$ $\quad \frac{5}{8} - \frac{1}{2}$ $\quad \frac{7}{10} - \frac{2}{5}$

3. $\begin{array}{r} 55697 \\ \underline{-4029} \end{array}$

4. $\begin{array}{r} 752 \\ \underline{\times 809} \end{array}$

5. $7\overline{)49583}$

6. Last month Bill saved \$1.06; Ned, \$.89, Jane, \$.37, Billy, \$.57, and Tom, \$.56. What was the average of their savings?

TEST II

1. $6\overline{)5911}$

2. $\begin{array}{r} 13033 \\ \underline{-7184} \end{array}$

3. $\begin{array}{r} 9468 \\ \underline{\times 87} \end{array}$

4. $\frac{2}{3} + \frac{3}{4} + \frac{1}{2}$ $\quad \frac{3}{8} \times \frac{4}{5}$ $\quad \frac{7}{8} - \frac{3}{4}$

5. $\begin{array}{r} \$69.35 \\ .78 \\ 74.45 \\ 6.79 \\ .89 \\ \underline{74.59} \end{array}$

6. The Cooper family started on a trip of 762 miles. The first day they drove 150 miles; the second, 201; the third, 209. How far did they drive in the three days? How many more miles had they to drive?

TEST III

1. $\begin{array}{r} 8\frac{1}{5} \\ 6\frac{1}{2} \\ \underline{9\frac{7}{10}} \end{array}$

2. $\begin{array}{r} \$14.06 \\ .49 \\ 91.46 \\ .38 \\ \underline{67.17} \end{array}$

3. $28\overline{)19146}$

4. $\begin{array}{r} 16499 \\ \underline{-6509} \end{array}$

5. $\begin{array}{r} 804 \\ \underline{\times 49} \end{array}$

6. Helen had to practice $\frac{3}{4}$ of an hour. When she had practiced $\frac{1}{2}$ the time, what part of an hour had she practiced?

TEST IV

1. $\begin{array}{r}\$62.13\\ .73\\ 52.55\\ 3.01\\ .23\\ 84.48\\ \hline\end{array}$

2. $\begin{array}{r}5\frac{3}{4}\\ 6\frac{1}{2}\\ 2\frac{2}{3}\\ \hline\end{array}$

3. $39\overline{)\$269.88}$

4. $\begin{array}{r}\$89.53\\ -40.75\\ \hline\end{array}$

5. $\begin{array}{r}\$38.29\\ \times 506\\ \hline\end{array}$

6. Roy earned \$1.35 a week for 7 weeks. He saved his money and bought a puppy for \$5.25. How much did he have left?

TEST V

1. $\begin{array}{r}\$117.11\\ -39.27\\ \hline\end{array}$

2. $\begin{array}{r}8603\\ \times 78\\ \hline\end{array}$

3. $\begin{array}{r}\$108.03\\ .14\\ 44.77\\ 40.55\\ .31\\ 5.05\\ \hline\end{array}$

4. $\frac{5}{9} \times \frac{8}{4}$

   $\frac{4}{5} + \frac{3}{10}$

   $\frac{7}{12} - \frac{1}{3}$

5. $4\overline{)\$3040.32}$

6. Fred worked 40 examples and $\frac{1}{8}$ of them were wrong. How many did he have correct? Mary worked 48 and missed $\frac{1}{8}$. How many did she have correct?

TEST VI

1. Add: $4282 + 350 + 2132 + 12 + 7620 + 233$.

2. $\begin{array}{r}15164\\ -8189\\ \hline\end{array}$

3. $9\overline{)52886}$

4. $3\overline{)210197}$

5. $\begin{array}{r}10\frac{3}{4}\\ -5\frac{1}{2}\\ \hline\end{array}$ $\begin{array}{r}24\\ \times 9\frac{2}{3}\\ \hline\end{array}$

6. What is the cost of $2\frac{1}{2}$ dozen oranges at 60 cents a dozen? If you paid for them with a two-dollar bill, how much change should you receive?

Rate yourself—

1 to 3 correct = Poor	5 correct = Good
4 correct = Fair	6 correct = Excellent

FIFTH GRADE

SECOND HALF

A BIRTHDAY SURPRISE

1. Father gave Alice and Bob some money to buy a birthday dinner for their mother. They bought 2 pounds of steak at 48¢ a pound, a loaf of bread for 10¢ and a pound of butter for 62¢. After they had paid for these things, they had \$3.32 left. How much money did they have at first?

2. Alice bought a head of lettuce for 10¢, a can of asparagus for 35¢, a bottle of salad dressing for 29¢ and a big bottle of olives for 42¢. She paid for these things with a two-dollar bill. How much change did she receive?

3. Alice also bought 8 little cakes at 48¢ a dozen. How much did she have to pay for them?

4. Bob ordered a quart and a half of ice cream at 72¢ a quart and $\frac{3}{4}$ of a pound of salted nuts at 68¢ a pound. How much did he pay for both?

5. Plan a dinner for your family and find out how much it would cost.

ADDITION DRILL

First be sure and then be quick.

Add without copying and check:

1.

7	4	9	5	2	6	6	1
7	7	3	5	3	5	6	8
9	3	8	7	5	3	3	5
9	7	8	4	5	6	2	3
6	5	4	8	9	9	8	9
7	6	6	6	6	4	2	8
9	7	8	9	9	6	7	8
6	9	7	8	5	4	6	9

2.

110	5972	318	7436
102	72	254	66
121	321	13	4532
10	9400	203	24
509	48	320	2154

3.

8993	9508	976	360
9656	688	196	456
89	47	647	40
6704	1532	99	8
745	59	617	756

4.

$ 6.85	$ 6.57	$ 93.78	$540.98
47.90	75.68	86.67	73.89
.52	8.97	8.89	759.89
75.89	17.56	76.97	5.56
8.78	9.69	826.32	97.84
95.88	47.88	97.96	976.97

SUBTRACTION DRILL

First be sure and then be quick.

Subtract without copying and prove:

1.	$102.03	$117.87	$548.84	$115.03
	86.02	97.48	199.02	64.43
2.	$440.00	$990.00	$142.39	$862.22
	334.57	811.21	76.74	218.28
3.	$689.69	$151.53	$137.78	$143.63
	564.87	31.21	45.87	50.09
4.	$145.22	$112.75	$147.77	$118.20
	66.40	81.46	62.33	50.47
5.	$139.37	$654.63	$118.52	$966.16
	85.61	310.65	77.82	305.33
6.	$145.55	$799.19	$176.81	$167.00
	89.94	19.49	89.33	89.72
7.	$151.18	$159.49	$116.91	$163.55
	83.24	89.91	70.22	64.84
8.	$133.49	$66.35	$152.73	$687.18
	87.59	63.40	72.16	413.58
9.	$115.42	$475.28	$567.94	$112.81
	80.55	106.12	5.57	34.30

PROBLEMS WITHOUT NUMBERS

1. If you know the cost of the railroad fare from one city to another, how can you find the cost of the round trip?

2. One of Ruth's classmates was sick, so the pupils in the class brought pennies, nickels and dimes to buy some flowers. If you knew the number of pennies, nickels and dimes that were given by Ruth's classmates, how could you find the whole amount?

3. John bought several articles at the store for his mother. If you knew the price of each article and the amount of money John had handed the clerk, how could you find how much change was due him?

4. Fred puts a certain amount in the school savings bank each week. What must you know and what should you do to find how much he saved in a given number of weeks?

5. A boy bought a camera. If you know how much money he had at first and how much he had left after he had paid for the camera, how could you find the cost of the camera?

6. If you know the total cost of several articles that sell for the same amount, how can you find the cost of one?

7. If you know Ruth's spelling mark each day for a week, how can you find her average mark for the week?

8. If you know the amount of money a man pays for rent each month, how can you find what rent he pays in a year?

9. If you know how far a ship has sailed in a day, how can you find its average rate per hour?

MULTIPLICATION DRILL

First be sure and then be quick.

Copy, multiply and check:

1. $.25 × 2	2. $.21 × 8	3. $.85 × 3	4. $.67 × 2	5. $.87 × 9
6. $.72 × 47	7. $.90 × 76	8. $.82 × 15	9. $.50 × 14	10. $.43 × 13
11. $1.04 × 39	12. $8.01 × 62	13. $1.67 × 81	14. $4.93 × 52	15. $6.79 × 83
16. $9.46 × 98	17. $7.53 × 80	18. $8.82 × 46	19. $7.46 × 6	20. $7.81 × 59
21. $8.34 × 24	22. $2.79 × 23	23. $1.26 × 13	24. $9.86 × 67	25. $42.16 × 600
26. $8.05 × 478	27. $3.46 × 407	28. $8.39 × 984	29. $5.32 × 596	30. $6.09 × 601
31. $2.51 × 507	32. $4.67 × 956	33. $1.02 × 453	34. $6.09 × 879	35. $3.48 × 678
36. $9.78 × 708	37. $2.53 × 608	38. $9.18 × 605	39. $5.06 × 598	40. $9.08 × 704
41. $17.69 × 47	42. $98.72 × 96	43. $64.05 × 79	44. $43.78 × 78	45. $87.23 × 89

DIVISION DRILL

First be sure and then be quick.

Divide without copying and prove. Place a folded answer paper above the examples:

1.	$2\overline{)8046}$	$5\overline{)1171}$	$3\overline{)6039}$	$6\overline{)7471}$
2.	$4\overline{)1205}$	$7\overline{)1407}$	$2\overline{)1357}$	$8\overline{)1609}$
3.	$9\overline{)9019}$	$6\overline{)4980}$	$5\overline{)2849}$	$3\overline{)1462}$
4.	$5\overline{)4006}$	$3\overline{)1789}$	$7\overline{)6602}$	$6\overline{)4777}$
5.	$7\overline{)6069}$	$8\overline{)3498}$	$4\overline{)1017}$	$2\overline{)1182}$
6.	$9\overline{)8407}$	$4\overline{)2705}$	$8\overline{)7169}$	$9\overline{)5114}$
7.	$4\overline{)39469}$	$7\overline{)39746}$	$5\overline{)35045}$	$8\overline{)4048}$
8.	$9\overline{)6886}$	$8\overline{)4785}$	$9\overline{)7869}$	$6\overline{)5809}$

DIVIDING DOLLARS AND CENTS

Copy, divide and prove:

1. $7\overline{)\$37.73}$	2. $5\overline{)\$38.25}$	3. $4\overline{)\$381.68}$	4. $8\overline{)\$59.44}$
5. $3\overline{)\$292.95}$	6. $7\overline{)\$29.96}$	7. $2\overline{)\$19.56}$	8. $9\overline{)\$81.27}$
9. $6\overline{)\$452.58}$	10. $3\overline{)\$25.02}$	11. $9\overline{)\$66.78}$	12. $4\overline{)\$320.28}$
13. $53\overline{)\$15.37}$	14. $38\overline{)\$40.28}$	15. $45\overline{)\$394.65}$	16. $78\overline{)\$728.52}$
17. $96\overline{)\$772.80}$	18. $63\overline{)\$469.35}$	19. $81\overline{)\$572.67}$	20. $69\overline{)\$365.01}$
21. $54\overline{)\$600.48}$	22. $49\overline{)\$758.03}$	23. $88\overline{)\$402.16}$	24. $94\overline{)\$757.64}$
25. $50\overline{)\$452.50}$	26. $34\overline{)\$257.72}$	27. $63\overline{)\$442.26}$	28. $72\overline{)\$468.72}$

A PROBLEM TEST

Number your answer paper from 1 to 12. The teacher will read the problems. Write only the answers.

1. How much should you pay for 1 can of soup, if 3 cans sell for 36 cents?

2. John is paid 25¢ an hour for work. How much is due him when he has worked 8 hours?

3. A man bought 10 gallons of gasoline at 18¢ a gallon. How much change should he receive from a $2 bill?

4. Mother bought 16 quarts of berries at 20¢ a quart. How much should she pay for them?

5. George bought two ties at 49¢ each. How much change should he receive from one dollar?

6. If an automobile traveled 120 miles in 4 hours, what was the average speed per hour?

7. If papers are sold by the 100 at $1\frac{1}{2}$¢ each, how much should you pay for a hundred?

8. At 11¢ each, how many melons can be bought for 99 cents?

9. What two numbers multiplied together will give a product of 63?

10. How many gallons of milk are there in a can that contains 32 quarts?

11. Ruth is 50 inches tall. Write the mixed number that tells her height in feet.

12. How much will 20 oranges cost at the rate of 5 for 20 cents?

HOME AND SCHOOL PROBLEMS

Find the facts that you need to answer these questions by asking the grocer, your teacher, or some one at home:

1. In what year was your school built? How old is it?

2. How many pupils are there in your school? What is the average number in each grade?

3. Ask your mother how much sugar and butter she uses in a week and the price of each. What does your mother pay each week for butter and sugar?

4. How is ice sold? How much does your family spend for ice during the summer?

5. What is the price of a ton of coal? How much does your winter's coal cost?

6. How much did your family pay for electricity last year? What was the average for a month?

7. Find out the price of chickens per pound. If a farmer sold 57 pounds of chickens, how much would he receive?

8. How much was paid for the desks in your room? How much did they cost apiece?

9. How many blackboard erasers are there in your room? If each grade has as many as your room, how many are there in use in the school?

10. About how many pencils do you use each year in school? At that rate tell how many your class will need for the year.

11. Make up problems about things you use every day.

TESTING OUR PROGRESS

Many fifth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

Copy only when necessary:

1.
$$\begin{array}{r} 989 \\ 989 \\ 569 \\ 76 \\ 788 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 407 \\ \times 789 \\ \hline \end{array}$$

3. $71\overline{)4828}$

4.
$$\begin{array}{r} \$48.59 \\ 7.36 \\ 98.87 \\ .89 \\ 26.57 \\ \hline \end{array}$$

5. Subtract 893 from 1679.

6. Multiply $70.10 by 200.

7. How much will 16 pounds of brown sugar cost at $4\frac{1}{2}$¢ a pound?

8. Dorothy's marks in different tests were 75, 80, 90, 96 and 100. Find her average mark for the five tests.

9. Mother bought 3 dozen eggs and used 7 of them in making sunshine cakes. How many eggs were left?

10. Write in figures: Twenty thousand forty-eight.

11. Find the product of 806 and $958.73.

12. Find the difference between $20.00 and $3.72.

Rate yourself—

1 to 7 correct = Poor	**9 or 10 correct = Good**
8 correct = Fair	**11 or 12 correct = Excellent**

TESTING OUR PROGRESS

Many fifth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

Copy only when necessary:

1. $\begin{array}{r} 372 \\ 368 \\ 754 \\ 65 \\ 648 \\ \hline \end{array}$

2. $\begin{array}{r} 11795 \\ -2009 \\ \hline \end{array}$

3. $\begin{array}{r} \$99.39 \\ .37 \\ 482.34 \\ .78 \\ 5.59 \\ \hline \end{array}$

4. $\begin{array}{r} 5386 \\ \times 70 \\ \hline \end{array}$

5. How much will $\frac{2}{3}$ of a yard of silk cost at 96¢ a yard?

6. How much must you pay for 6 cans of soup at $12\frac{1}{2}$¢ a can and a pound of butter at 56 cents?

7. If a dress pattern requires $2\frac{5}{6}$ yards of material, how much would be needed to make dresses for the Brown twins?

8. $\begin{array}{r} 5489 \\ 1969 \\ 83 \\ 6791 \\ \hline \end{array}$

9. $\begin{array}{r} 14183 \\ -8431 \\ \hline \end{array}$

10. $\begin{array}{r} 968 \\ \times 984 \\ \hline \end{array}$

11. $54\overline{)4484}$

12. Liquid soap that is used in a school costs $39.50 a barrel. If there are 50 gallons in a barrel, how much does the soap cost per gallon?

Rate yourself—

1 to 7 correct = Poor	9 or 10 correct = Good
8 correct = Fair	11 or 12 correct = Excellent

BARGAIN SALES

In store windows you sometimes see signs that tell about goods that are for sale at less than the usual price. A sign may say that a certain article is for sale at "$\frac{1}{4}$ off." "$\frac{1}{4}$ off" means that $\frac{1}{4}$ of the price has been taken off. If the price was \$4, the new price, at $\frac{1}{4}$ off, would be \$3.

A straw hat that sold in April for \$6.00 was marked "$\frac{1}{3}$ off" in June. What was the sale price of the hat?

$\frac{1}{3}$ of \$6 = \$2. \$6 — \$2 = \$4, the sale price.

At "$\frac{1}{3}$ off" find the cost of articles marked as follows:

1.	Boy's suit	\$12.00	4.	Tennis racquet	\$6.60
2.	Straw hat	\$ 4.50	5.	Catcher's mitt	\$2.40
3.	Boy's overcoat	\$10.80	6.	Football	\$7.50

At "$\frac{1}{4}$ off" find the cost of the following articles:

1.	Radio set	\$64.00	4.	Girl's coat	\$24.00
2.	Camping tent	\$16.00	5.	Girl's dress	\$19.60
3.	Camera	\$16.60	6.	Scooter	\$ 8.80

Find the cost of these articles at "$\frac{1}{2}$ off."

1.	Victrola	\$52.00	4.	Cornet	\$17.50
2.	Camera	\$24.00	5.	Banjo	\$ 6.50
3.	Canoe	\$36.00	6.	Sweater	\$ 4.50

WHAT DO I KNOW ABOUT FRACTIONS?

1. What are the terms of a fraction called?

2. What does each of the terms show?

3. What kinds of fractions are there?

4. How many eighths are there in 5 units? How do I find the answer?

5. How can I change $7\frac{1}{4}$ to fourths?

6. How is $\frac{25}{3}$ changed to a mixed number?

7. Which is larger, $\frac{1}{6}$ or $\frac{1}{12}$? $\frac{2}{8}$ or $\frac{2}{16}$? How do I know?

8. How can I change $\frac{2}{3}$ to twelfths?

9. If I multiply both terms of a fraction by the same number, do I change the value of the fraction?

10. How can I change or *reduce* $\frac{16}{32}$ to lower terms? What are the lowest terms of $\frac{16}{32}$? Why?

11. If I divide both terms of a fraction by the same number, do I change the value of the fraction?

12. How can I find the smallest multiple of two or more numbers? What is the smallest multiple of 2, 4 and 8? Of 2, 3 and 4?

13. What must I do to unlike fractions before I can add or subtract them?

14. What is the least common denominator of two or more fractions?

15. How can I find the least common denominator of the fractions $\frac{1}{6}$, $\frac{3}{8}$, $\frac{3}{4}$? What is it?

16. How can I find $\frac{7}{8}$ of 64?

Change these groups of fractions to fractions having the least common denominator:

1. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}$	4. $\frac{2}{5}, \frac{3}{10}, \frac{1}{4}$	7. $\frac{2}{5}, \frac{1}{2}, \frac{7}{10}$
2. $\frac{2}{3}, \frac{5}{6}, \frac{1}{4}$	5. $\frac{5}{8}, \frac{2}{3}, \frac{7}{12}$	8. $\frac{1}{9}, \frac{2}{3}, \frac{5}{6}$
3. $\frac{3}{8}, \frac{1}{3}, \frac{3}{4}$	6. $\frac{1}{2}, \frac{5}{6}, \frac{3}{12}$	9. $\frac{1}{6}, \frac{4}{9}, \frac{5}{12}$

ADDING MIXED NUMBERS

One week the basket ball team practiced $5\frac{1}{2}$ hours. The next week they practiced $3\frac{2}{3}$ hours and the third week they practiced $1\frac{3}{4}$ hours. How many hours did they practice in the 3 weeks?

How to Add Mixed Numbers

$5\frac{1}{2} + 3\frac{2}{3} + 1\frac{3}{4} =$

12 is the least common denominator

$$\begin{aligned} 5\tfrac{1}{2} &= 5\tfrac{6}{12} \\ 3\tfrac{2}{3} &= 3\tfrac{8}{12} \\ 1\tfrac{3}{4} &= 1\tfrac{9}{12} \\ \hline & 10\tfrac{11}{12} \end{aligned}$$

Change the fractions to fractions having the least common denominator, and add.

If their sum is an improper fraction, change it to a mixed number. Write the fraction and carry the whole number to add to the other whole numbers.

The team practiced $10\frac{11}{12}$ hours in 3 weeks.

Change to like fractions and add:

1. $\frac{1}{2} + \frac{3}{4} + \frac{2}{3}$	9. $\frac{7}{20} + \frac{3}{5} + \frac{3}{4}$
2. $\frac{1}{3} + \frac{5}{6} + \frac{3}{4}$	10. $1\frac{2}{3} + 2\frac{3}{5} + \frac{1}{5}$
3. $\frac{3}{8} + \frac{3}{4} + \frac{1}{2}$	11. $2\frac{5}{6} + 1\frac{1}{2} + 1\frac{2}{3}$
4. $\frac{2}{5} + \frac{1}{2} + \frac{3}{4}$	12. $3\frac{1}{2} + 4\frac{1}{8} + 2\frac{1}{6}$
5. $\frac{7}{12} + \frac{5}{6} + \frac{2}{3}$	13. $1\frac{5}{9} + 1\frac{1}{3} + 2\frac{2}{3}$
6. $\frac{5}{8} + \frac{1}{2} + \frac{1}{4}$	14. $3\frac{7}{8} + 1\frac{3}{4} + 2\frac{5}{16}$
7. $\frac{7}{8} + \frac{5}{6} + \frac{3}{4}$	15. $4\frac{4}{5} + 1\frac{7}{10} + 3\frac{1}{2}$
8. $\frac{5}{12} + \frac{3}{8} + \frac{1}{4}$	16. $1\frac{3}{4} + 2\frac{7}{8} + 1\frac{1}{3}$

USING FRACTIONS IN PROBLEMS

1. Anna sold cloth at the bargain counter in a store. These were some of the sales she made. How many yards were there in each sale?

1st sale	2nd sale	3rd sale	4th sale	5th sale
yd.	yd.	yd.	yd.	yd.
$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{2}$
$\frac{5}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$

2. Helen made these sales of candy at the church fair. What was the total weight of each sale?

1st sale	2nd sale	3rd sale	4th sale	5th sale
lb.	lb.	lb.	lb.	lb.
$\frac{1}{4}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{3}{4}$
$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{5}{8}$

3. A girl used $\frac{7}{8}$ of a yard of canvas to make a book bag and $\frac{1}{4}$ of a yard for a pencil case. How much canvas did she use for both?

4. To reach the baseball field James walked $\frac{5}{8}$ of a mile and then rode $\frac{3}{4}$ of a mile on the trolley. How far did he have to go to reach the baseball field?

5. Alice made some cushions for her room. She used $3\frac{3}{4}$ yards of flowered material and $1\frac{5}{8}$ yards of plain material. How many yards did she use in all?

6. Tom raises sweet corn to sell. One week he sold $8\frac{3}{4}$ dozen ears and the next week $6\frac{2}{3}$ dozen. How many dozen ears did he sell in all?

7. One day last fall Tom gathered $1\frac{1}{2}$ bushels of chestnuts. The next day he picked up $\frac{3}{8}$ of a bushel. How many chestnuts did he gather in the two days?

SUBTRACTING MIXED NUMBERS FROM WHOLE NUMBERS

Fred bought 8 quarts of corn and fed $3\frac{3}{4}$ quarts to his ducks. How many quarts did he have left?

How to Subtract Mixed Numbers from Whole Numbers

$$8 - 3\tfrac{3}{4} =$$

$$\begin{array}{rcr} 8 & = & 7\frac{4}{4} \\ 3\frac{3}{4} & = & \underline{3\frac{3}{4}} \\ & & 4\frac{1}{4} \end{array}$$

Change the whole number to a mixed number by writing one of its units as a fraction having the same denominator as the fraction of the subtrahend.

Subtract the fractions. Then subtract the whole numbers.

Fred had $4\frac{1}{4}$ quarts left.

Subtract:

1. $\begin{array}{r}10\\ \underline{6\frac{1}{2}}\end{array}$	2. $\begin{array}{r}9\\ \underline{3\frac{3}{4}}\end{array}$	3. $\begin{array}{r}11\\ \underline{7\frac{1}{3}}\end{array}$	4. $\begin{array}{r}20\\ \underline{9\frac{3}{8}}\end{array}$	5. $\begin{array}{r}16\\ \underline{8\frac{2}{3}}\end{array}$
6. $\begin{array}{r}7\\ \underline{4\frac{7}{8}}\end{array}$	7. $\begin{array}{r}10\\ \underline{6\frac{1}{4}}\end{array}$	8. $\begin{array}{r}14\\ \underline{7\frac{5}{8}}\end{array}$	9. $\begin{array}{r}12\\ \underline{8\frac{2}{5}}\end{array}$	10. $\begin{array}{r}16\\ \underline{9\frac{5}{6}}\end{array}$
11. $\begin{array}{r}3\\ \underline{1\frac{2}{3}}\end{array}$	12. $\begin{array}{r}17\\ \underline{3\frac{4}{5}}\end{array}$	13. $\begin{array}{r}5\\ \underline{2\frac{6}{7}}\end{array}$	14. $\begin{array}{r}21\\ \underline{4\frac{4}{9}}\end{array}$	15. $\begin{array}{r}9\\ \underline{2\frac{5}{6}}\end{array}$
16. $\begin{array}{r}23\\ \underline{11\frac{5}{6}}\end{array}$	17. $\begin{array}{r}13\\ \underline{7\frac{5}{8}}\end{array}$	18. $\begin{array}{r}12\\ \underline{4\frac{2}{3}}\end{array}$	19. $\begin{array}{r}17\\ \underline{3\frac{1}{16}}\end{array}$	20. $\begin{array}{r}25\\ \underline{12\frac{7}{12}}\end{array}$

1. Mrs. Hall baked 4 mince pies for Thanksgiving and served $2\frac{3}{4}$ pies at the dinner. How many pies were left?

2. A pailful of honey weighed 5 pounds. How much was left after $2\frac{1}{3}$ pounds had been used?

3. Ruth weighed $48\frac{3}{4}$ pounds in September and 51 pounds the next February. How much had she gained?

SUBTRACTING MIXED NUMBERS

John and his father went fishing. John caught a fish that weighed $1\frac{3}{4}$ pounds and his father caught one that weighed $3\frac{1}{8}$ pounds. How much heavier was his father's fish?

How to Subtract Mixed Numbers

$3\frac{1}{8} - 1\frac{3}{4} =$

$$
\begin{array}{r}
3\frac{1}{8} = 3\frac{1}{8} = 2\frac{9}{8} \\
1\frac{3}{4} = 1\frac{6}{8} = \underline{1\frac{6}{8}} \\
1\frac{3}{8}
\end{array}
$$

Change the fractions to like fractions.

If the fraction of the subtrahend is larger than the fraction of the minuend, add one unit of the minuend to its fraction.

Subtract the fractions. Then subtract the whole numbers.

His father's fish was $1\frac{3}{8}$ pounds heavier.

Copy and subtract:

1.	$7\frac{7}{8} - 3\frac{1}{2}$	14.	$15\frac{7}{16} - 12\frac{3}{8}$	27.	$18\frac{5}{8} - 9\frac{7}{8}$
2.	$9\frac{5}{8} - 4\frac{1}{4}$	15.	$22\frac{7}{9} - 11\frac{1}{6}$	28.	$10\frac{4}{8} - 8\frac{1}{3}$
3.	$12\frac{5}{8} - 4\frac{3}{4}$	16.	$13\frac{2}{7} - 9\frac{1}{2}$	29.	$29\frac{2}{9} - 18\frac{1}{6}$
4.	$12\frac{4}{5} - 6\frac{3}{10}$	17.	$12\frac{7}{8} - 9\frac{1}{2}$	30.	$15\frac{5}{6} - 9\frac{3}{4}$
5.	$16\frac{5}{6} - 8\frac{2}{3}$	18.	$11\frac{2}{5} - 5\frac{2}{3}$	31.	$12\frac{1}{2} - 8\frac{3}{5}$
6.	$22\frac{1}{2} - 11\frac{3}{4}$	19.	$16\frac{1}{4} - 8\frac{2}{3}$	32.	$16\frac{3}{10} - 12\frac{3}{4}$
7.	$16\frac{3}{8} - 4\frac{2}{3}$	20.	$18\frac{7}{10} - 9\frac{1}{4}$	33.	$30\frac{4}{5} - 20\frac{1}{2}$
8.	$32\frac{4}{9} - 20\frac{1}{2}$	21.	$12\frac{4}{5} - 9\frac{1}{3}$	34.	$16\frac{2}{3} - 11\frac{1}{6}$
9.	$26\frac{5}{16} - 11\frac{1}{8}$	22.	$17\frac{3}{4} - 8\frac{2}{3}$	35.	$18\frac{5}{6} - 10\frac{8}{9}$
10.	$17\frac{2}{5} - 12\frac{1}{2}$	23.	$24\frac{4}{5} - 16\frac{3}{4}$	36.	$15\frac{3}{20} - 8\frac{1}{4}$
11.	$9\frac{7}{12} - 5\frac{3}{8}$	24.	$16\frac{5}{8} - 7\frac{2}{3}$	37.	$30\frac{9}{12} - 15\frac{1}{2}$
12.	$16\frac{5}{6} - 9\frac{3}{4}$	25.	$11\frac{1}{2} - 8\frac{3}{8}$	38.	$16\frac{3}{4} - 16\frac{1}{4}$
13.	$12\frac{1}{2} - 7\frac{2}{3}$	26.	$14\frac{7}{8} - 7\frac{1}{2}$	39.	$25\frac{1}{3} - 19\frac{5}{8}$

PRACTICING MUSIC LESSONS

Grace was expected to practice her music lessons for 6 hours a week. Her mother told her to keep a record of the time she practiced each day. Here is Grace's record in hours:

	1st wk.	2nd wk.	3rd wk.	4th wk.
Monday	1	$\frac{3}{4}$	1	$1\frac{1}{4}$
Tuesday	$\frac{1}{2}$	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$
Wednesday	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$
Thursday	$1\frac{1}{4}$	$\frac{1}{2}$	$1\frac{1}{2}$	1
Friday	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$
Saturday	1	1	$2\frac{1}{4}$	2

1. How many hours did Grace practice each week?

2. Which week did she practice the most time?

3. Which week did she practice the least time?

4. Find the difference between the number of hours she practiced in the 3rd and 4th weeks.

5. Find the total number of hours she practiced in all.

6. How much less than 6 hours did Grace practice the first week?

7. The fifth week Grace practiced $\frac{3}{4}$ of an hour a day for 6 days. How many hours did she practice that week?

MULTIPLYING FRACTIONS AND MIXED NUMBERS BY FRACTIONS

Mrs. Brown bought $\frac{3}{4}$ of a peck of peas and used $\frac{1}{3}$ of them for dinner. What part of a peck did she use?

How to Multiply a Fraction by a Fraction

$\frac{1}{3}$ of $\frac{3}{4} =$

$\frac{1}{\cancel{3}} \times \frac{\cancel{3}}{4} = \frac{1}{4}$

First cancel any common factors from the numerators and denominators. Then multiply the numerators together for a new numerator and the denominators together for a new denominator.

Mrs. Brown used $\frac{1}{4}$ of a peck.

Copy and multiply. Cancel when you can:

1. $\frac{3}{4} \times \frac{1}{2}$	3. $\frac{5}{6} \times \frac{9}{10}$	5. $\frac{3}{10} \times \frac{4}{5}$	7. $\frac{2}{5} \times \frac{5}{8}$
2. $\frac{3}{8} \times \frac{1}{4}$	4. $\frac{5}{8} \times \frac{2}{3}$	6. $\frac{2}{5} \times \frac{1}{8}$	8. $\frac{5}{6} \times \frac{3}{12}$

How long will it take Marjorie to read $6\frac{1}{2}$ pages of a book if she can read one page in $\frac{3}{4}$ of a minute?

How to Multiply a Mixed Number by a Fraction

$6\frac{1}{2} \times \frac{3}{4} =$

$6\frac{1}{2} = \frac{13}{2}$

$\frac{13}{2} \times \frac{3}{4} = \frac{39}{8} = 4\frac{7}{8}$

Change the mixed number to an improper fraction and multiply.

It will take Marjorie $4\frac{7}{8}$ minutes.

Copy and multiply:

1. $\frac{3}{4} \times 5\frac{1}{3}$	5. $\frac{1}{2} \times 8\frac{2}{5}$	9. $\frac{3}{5} \times 4\frac{3}{8}$
2. $\frac{5}{8} \times 3\frac{1}{10}$	6. $\frac{2}{3} \times 16\frac{2}{3}$	10. $\frac{2}{3} \times 8\frac{2}{5}$
3. $\frac{1}{2} \times 7\frac{1}{3}$	7. $\frac{8}{9} \times 8\frac{1}{4}$	11. $11\frac{4}{5} \times \frac{5}{6}$
4. $\frac{5}{8} \times 9\frac{3}{5}$	8. $\frac{6}{7} \times 9\frac{2}{3}$	12. $16\frac{1}{2} \times \frac{2}{3}$

USING WHOLE AND MIXED NUMBERS IN MULTIPLICATION

A vegetable dealer put 5 baskets of apples in his delivery wagon. Each basket weighed $24\frac{3}{4}$ pounds. How much did they all weigh?

How to Multiply a Mixed Number by a Whole Number

$$24\tfrac{3}{4} \times 5 =$$

$$\begin{array}{r} 24\tfrac{3}{4} \\ 5 \\ \hline 4\overline{)15} \\ \hline 3\tfrac{3}{4} \\ 120 \\ \hline 123\tfrac{3}{4} \end{array}$$

Multiply the numerator of the fraction by the multiplier.

Divide the product by the denominator of the fraction.

Multiply the whole number of the mixed number by the multiplier.

Add.

The apples weighed $123\frac{3}{4}$ pounds.

A farmer sold a field of $15\frac{3}{4}$ acres for \$120 an acre. How much did he receive?

How to Multiply a Whole Number by a Mixed Number

$$120 \times 15\tfrac{3}{4} =$$

$$\begin{array}{r} 120 \\ 15\tfrac{3}{4} \\ \hline 4\overline{)360} \\ \hline 90 \\ 600 \\ 120 \\ \hline 1890 \end{array}$$

Multiply the whole number by the numerator of the fraction.

Divide the product by the denominator of the fraction.

Multiply the whole number by the whole number of the multiplier.

Add.

The farmer received \$1890.

Copy and multiply:

1.	$12 \times 4\frac{3}{4}$	5.	$37\frac{2}{3} \times 18$	9.	$20 \times 5\frac{4}{5}$
2.	$15\frac{1}{2} \times 6$	6.	$64 \times 6\frac{5}{8}$	10.	$18\frac{5}{6} \times 12$
3.	$14\frac{1}{5} \times 5$	7.	$85\frac{2}{3} \times 12$	11.	$27 \times 19\frac{1}{3}$
4.	$18 \times 2\frac{2}{3}$	8.	$19 \times 4\frac{5}{6}$	12.	$64\frac{5}{8} \times 16$

Copy and multiply:

1. $19 \times 3\frac{3}{4}$	6. $124 \times 8\frac{3}{8}$	11. $78\frac{2}{3} \times 14$
2. $27\frac{1}{2} \times 9$	7. $240 \times 3\frac{4}{5}$	12. $36 \times 7\frac{5}{8}$
3. $69 \times 7\frac{2}{3}$	8. $90 \times 8\frac{7}{10}$	13. $42 \times 9\frac{5}{6}$
4. $82\frac{1}{2} \times 8$	9. $98\frac{3}{5} \times 15$	14. $37\frac{1}{2} \times 24$
5. $16 \times 7\frac{3}{4}$	10. $42\frac{7}{8} \times 8$	15. $32 \times 6\frac{2}{3}$

SOME WAYS OF EARNING MONEY

1. John helped a grocer on Saturdays and was paid 25 cents an hour. One Saturday he worked $6\frac{2}{5}$ hours. How much did he receive?

2. Mrs. Warren gives Ruth 35 cents an hour for looking after the children. Ruth took care of the children $3\frac{3}{5}$ hours one day. How much did she earn?

3. If Bill makes $1\frac{1}{2}$¢ on each newspaper he sells, what will be his profit on 48 papers?

4. One summer afternoon, Mary Louise sold lemonade and made $2\frac{3}{4}$ cents on each glass. She sold 36 glasses. How much did she make?

5. Fred worked Saturdays for 30 cents an hour. How much did he earn if he worked $5\frac{1}{2}$ hours?

6. David lives on a farm and earns money by selling eggs. One week he sold $5\frac{1}{2}$ dozen at 56 cents a dozen. How much did he receive for them?

7. Ned has a garden. One day he sold 12 quarts of beans to one of his neighbors at the rate of 2 quarts for 25 cents. How much did he receive for the beans?

8. Jack delivered packages for the butcher, who paid him 20 cents an hour. How much did Jack earn in a week if he worked $7\frac{1}{2}$ hours?

TESTING ANSWERS BY ESTIMATING

We can often test our answers by estimating whether they are about what they should be. For instance:

If we are asked to find the cost of 12 pounds of sugar at $6\frac{1}{4}$ cents a pound, we know that the answer must be more than 72 cents, which would be the cost at 6 cents a pound, and it must be less than 84 cents, which would be the cost at 7 cents a pound. Since the price $6\frac{1}{4}$ cents is between 6 cents and 7 cents, our answer must be between 72 cents and 84 cents.

Choose the correct answer from the numbers following each of these six examples. Give the reason for your choice. Prove you are right by working each example.

1.	$20 \times 85 =$	1600	or	1800	or	1700
2.	$8\frac{2}{3} \times 30 =$	270	or	260	or	240
3.	$\frac{3}{4}$ of $800 =$	400	or	800	or	600
4.	$5\frac{1}{4} \times 6\frac{1}{3} =$	$33\frac{1}{4}$	or	42	or	30
5.	$100 \times \$2.50 =$	\$25	or	\$250	or	\$2500
6.	$6 \times 1\frac{3}{4} =$	6	or	12	or	$10\frac{1}{2}$

1. How do you know that $4\frac{1}{2}$ times 8 is less than 40 and more than 32?

2. Will a bushel of strawberries at 25 cents a quart cost \$6.40, \$8.00, or \$9.60?

3. Will $46\frac{1}{2}$ bushels of potatoes at \$2.00 a bushel bring \$80, \$100, or \$93?

4. Will a piece of silk $\frac{2}{3}$ of a yard long at \$.75 a yard cost more than a dollar or less than a dollar? Why?

5. Will coal weighing $4\frac{1}{2}$ tons, at \$15 a ton, cost \$60, \$67.50 or \$75?

DIVISION OF FRACTIONS

1	
$\frac{1}{2}$	$\frac{1}{2}$

This drawing shows that $\frac{1}{2}$ is contained in 1 *two times.* Dividing a number by $\frac{1}{2}$ is the same as multiplying the number by 2. $1 \div \frac{1}{2} = 1 \times 2$, which is the same as $1 \times \frac{2}{1}$.

1		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

This drawing shows that $\frac{1}{3}$ is contained in 1 *three times.* Dividing a number by $\frac{1}{3}$ is the same as multiplying the number by 3. $1 \div \frac{1}{3} = 1 \times 3$, which is the same as $1 \times \frac{3}{1}$.

1			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

This drawing shows that $\frac{1}{4}$ is contained in 1 *four times.* Dividing a number by $\frac{1}{4}$ is the same as multiplying the number by 4. $1 \div \frac{1}{4} = 1 \times 4$, which is the same as $1 \times \frac{4}{1}$.

When we rewrite the fraction $\frac{1}{4}$, so that the 4 is the numerator, and the 1 is the denominator, we call it *inverting* the fraction. $\frac{1}{4}$ inverted is $\frac{4}{1}$.

Invert these fractions: $\frac{5}{9}$, $\frac{7}{8}$, $\frac{11}{16}$, $\frac{9}{5}$, $\frac{15}{6}$.

The whole number 2, or 2 units, can be written in the form of a fraction, $\frac{2}{1}$.

Write these whole numbers in the form of fractions and invert them:

6 5 3 4 9 2 8 7

DIVIDING A WHOLE NUMBER BY A FRACTION

Mother bought 6 pounds of candy for Jack's party. She gave Jack and each guest $\frac{1}{4}$ of a pound. If all the candy was used, how many children were at the party?

How to Divide a Whole Number by a Fraction

$6 \div \frac{1}{4} =$	Invert the divisor.
$6 \div \frac{1}{4} = 6 \times \frac{4}{1} = \frac{24}{1} = 24$	Multiply.

There were 24 children at the party.

Copy and divide:

1.	$12 \div \frac{2}{3}$	4.	$10 \div \frac{2}{5}$	7.	$32 \div \frac{4}{7}$	10.	$10 \div \frac{5}{6}$
2.	$18 \div \frac{3}{4}$	5.	$22 \div \frac{1}{8}$	8.	$13 \div \frac{1}{10}$	11.	$16 \div \frac{8}{9}$
3.	$15 \div \frac{3}{5}$	6.	$28 \div \frac{7}{8}$	9.	$18 \div \frac{9}{25}$	12.	$14 \div \frac{4}{5}$

DIVIDING A FRACTION BY A WHOLE NUMBER

In going to school 5 mornings Elizabeth walked $\frac{5}{8}$ of a mile in all. How far did she walk each morning?

How to Divide a Fraction by a Whole Number

$\frac{5}{8} \div 5 =$	Write the whole number as a fraction with 1 as the denominator. Invert it.
$\frac{5}{8} \div 5 = \frac{5}{8} \div \frac{5}{1} = \frac{5}{8} \times \frac{1}{5} = \frac{1}{8}$	Cancel and multiply.

Elizabeth walked $\frac{1}{8}$ of a mile each morning.

Copy and divide:

1.	$\frac{9}{10} \div 3$	4.	$\frac{3}{8} \div 5$	7.	$\frac{3}{10} \div 5$	10.	$\frac{11}{12} \div 11$
2.	$\frac{7}{8} \div 7$	5.	$\frac{1}{3} \div 7$	8.	$\frac{7}{8} \div 8$	11.	$\frac{4}{5} \div 12$
3.	$\frac{5}{9} \div 10$	6.	$\frac{5}{6} \div 15$	9.	$\frac{15}{16} \div 10$	12.	$\frac{7}{24} \div 7$

DIVIDING A FRACTION BY A FRACTION

$\frac{1}{2}$		$\frac{1}{2}$	
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

How many times is $\frac{1}{4}$ contained in $\frac{1}{2}$? $\frac{1}{2} \div \frac{1}{4} = 2$.

$$\frac{1}{2} \div \frac{1}{4} = \frac{1}{\cancel{2}} \times \frac{\overset{2}{\cancel{4}}}{1} = 2$$

It takes $\frac{1}{8}$ of a yard of silk to make one tie. How many ties can be made from $\frac{3}{4}$ of a yard?

How to Divide a Fraction by a Fraction

$\frac{3}{4} \div \frac{1}{8} =$

$\frac{3}{4} \div \frac{1}{8} = \frac{3}{\cancel{4}} \times \frac{\overset{2}{\cancel{8}}}{1} = 6$

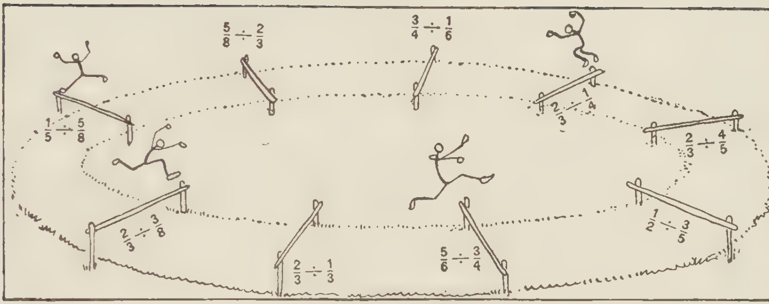
Invert the divisor. Cancel and multiply.

6 ties can be made from $\frac{3}{4}$ of a yard.

Remember: To divide a fraction by a fraction, we invert the divisor and multiply.

Copy and divide:

1. $\frac{1}{5} \div \frac{1}{3}$	11. $\frac{5}{8} \div \frac{5}{6}$	21. $\frac{5}{8} \div \frac{2}{5}$
2. $\frac{2}{3} \div \frac{7}{8}$	12. $\frac{5}{6} \div \frac{1}{3}$	22. $\frac{5}{6} \div \frac{2}{3}$
3. $\frac{3}{4} \div \frac{1}{2}$	13. $\frac{1}{4} \div \frac{3}{4}$	23. $\frac{7}{16} \div \frac{1}{4}$
4. $\frac{3}{4} \div \frac{7}{8}$	14. $\frac{1}{3} \div \frac{2}{5}$	24. $\frac{7}{10} \div \frac{1}{10}$
5. $\frac{1}{2} \div \frac{2}{3}$	15. $\frac{4}{5} \div \frac{2}{3}$	25. $\frac{5}{12} \div \frac{1}{4}$
6. $\frac{3}{10} \div \frac{2}{3}$	16. $\frac{3}{5} \div \frac{1}{10}$	26. $\frac{3}{5} \div \frac{1}{5}$
7. $\frac{2}{3} \div \frac{1}{2}$	17. $\frac{2}{5} \div \frac{3}{10}$	27. $\frac{2}{3} \div \frac{1}{16}$
8. $\frac{3}{4} \div \frac{1}{3}$	18. $\frac{7}{8} \div \frac{3}{4}$	28. $\frac{5}{8} \div \frac{1}{2}$
9. $\frac{7}{8} \div \frac{5}{6}$	19. $\frac{3}{4} \div \frac{2}{9}$	29. $\frac{1}{2} \div \frac{1}{10}$
10. $\frac{1}{3} \div \frac{3}{4}$	20. $\frac{1}{4} \div \frac{2}{3}$	30. $\frac{7}{12} \div \frac{1}{16}$



How many of these hurdles can you jump? Each correct answer counts one.

DIVIDING A MIXED NUMBER BY A MIXED NUMBER

Fred works after school in a grocery store. Last week he earned $2\frac{1}{4}$ dollars by working for $7\frac{1}{2}$ hours. How much did he earn per hour?

How to Divide a Mixed Number by a Mixed Number

$2\frac{1}{4} \div 7\frac{1}{2} =$

$2\frac{1}{4} = \frac{9}{4}$ — Change the mixed numbers

$7\frac{1}{2} = \frac{15}{2}$ — to improper fractions.

Invert the divisor.

$\frac{9}{4} \div \frac{15}{2} = \frac{\overset{3}{\cancel{9}}}{\underset{2}{\cancel{4}}} \times \frac{\cancel{2}}{\underset{5}{\cancel{15}}} = \frac{3}{10}$ — Cancel and multiply.

Fred earned $\frac{3}{10}$ of a dollar per hour.

1. $8\frac{1}{2} \div 1\frac{1}{4}$	8. $7\frac{1}{2} \div 4\frac{1}{6}$	15. $10\frac{5}{8} \div 3\frac{2}{5}$
2. $6\frac{2}{3} \div 3\frac{3}{4}$	9. $1\frac{2}{5} \div 8\frac{3}{4}$	16. $4\frac{2}{5} \div 2\frac{1}{5}$
3 $7\frac{1}{5} \div 4\frac{1}{2}$	10. $2\frac{5}{6} \div 6\frac{3}{8}$	17. $7\frac{1}{2} \div 2\frac{1}{4}$
4. $5\frac{5}{8} \div 1\frac{4}{5}$	11. $4\frac{1}{6} \div 6\frac{2}{3}$	18. $3\frac{1}{5} \div 2\frac{2}{5}$
5. $9\frac{1}{6} \div 1\frac{2}{3}$	12. $7\frac{3}{5} \div 4\frac{3}{4}$	19. $5\frac{3}{4} \div 4\frac{3}{5}$
6. $1\frac{2}{5} \div 5\frac{1}{4}$	13. $9\frac{1}{6} \div 2\frac{1}{2}$	20. $6\frac{1}{4} \div 3\frac{1}{8}$
7 $5\frac{5}{8} \div 2\frac{1}{4}$	14. $5\frac{2}{3} \div 3\frac{7}{9}$	21. $2\frac{2}{3} \div 4\frac{4}{5}$

FINDING THE VALUE OF ONE UNIT

If 8 oranges cost 40 cents what will 12 oranges cost?

$\frac{1}{8}$ of $40 = 5$ $12 \times 5 = 60$	First find the cost of 1 orange. If 8 oranges cost 40 cents, 1 orange will cost $\frac{1}{8}$ of 40 cents or 5 cents. 12 oranges will cost 12×5 cents or 60 cents.

1. If 12 yards of dress goods cost \$24, what will 7 yards cost?

2. If you have to pay 28 cents for riding 7 miles on a train, how much will you have to pay for riding 15 miles?

3. If a man saves \$60 in 2 months how much will he save in 9 months at the same rate?

4. George eats 35 pancakes for breakfast in 7 days. How many will he eat in 3 weeks if he has the same number of pancakes each morning?

5. If I paid \$1.60 for 4 bathing caps and my sisters bought 3 of them from me at the same price, how much did they pay me?

6. If John can do examples at the rate of 4 in 16 minutes, how long will it take him to do 5 examples?

7. If 6 books can be bought for \$9, how much will 7 books cost at the same rate?

8. If Arthur can walk $6\frac{1}{4}$ miles in 2 hours, how far can he walk in 3 hours at the same rate?

9. If Charlotte gains 18 ounces in $2\frac{2}{5}$ months, how many ounces will she gain in 6 months at the same rate?

ONE NUMBER IS HOW MANY TIMES LARGER THAN ANOTHER?

Four pairs of stockings cost \$1.00. What will one dozen pairs cost?

$\frac{1}{4}$ of \$1.00 = 25 cents = the cost of 1 pair.

$12 \times 25¢$ = \$3.00 = the cost of 12 pairs.

Here is a shorter way to work this problem:

$4\overline{)12}$ with quotient 3	The cost of 12 is how many times the cost of 4? $12 \div 4 = 3$.
$3 \times 1 = 3$	As 12 is 3 times 4, multiply the cost of four pairs by 3. $3 \times \$1.00 = \$3.00$.
	12 pairs cost \$3.00.

1. At 2 for 5 cents, how much will 10 marbles cost?

2. If 4 oranges cost 15¢, how much would 2 dozen cost?

3. When lemons are selling at the rate of 3 for 10 cents, how much will a dozen cost?

4. Two pounds of sugar cost 15¢. What will 10 pounds cost?

5. When cans of beans sell at 2 for 25¢, how much will 20 cans cost?

6. At 3 marbles for 5¢, how much will 15 cost?

7. If three handkerchiefs cost 50¢, what will 9 cost?

8. A party of 16 girls from a fifth grade went to a picnic. What was the cost of the fares going and coming, if 4 trolley tickets could be bought for 25 cents? How much was saved by buying tickets instead of paying 7-cent fares?

FINDING WHAT PART ONE NUMBER IS OF ANOTHER NUMBER

3 inches is what part of a foot?

1 foot $= 12$ inches. 1 inch $= \frac{1}{12}$ of a foot.

3 inches $= 3 \times \frac{1}{12} = \frac{3}{12}$ or $\frac{1}{4}$ of a foot.

3 inches is $\frac{1}{4}$ of a foot.

Here is a shorter way to work this problem:

How to Find What Part One Number Is of Another

3 is what part of 12?	Write the two numbers as a fraction, using as the denominator the number of which the other is a part.
$\frac{3}{12} = \frac{1}{4}$	Then reduce to lowest terms.

The first number in each group is what part of the second?

5, 50	9, 54	8, 72	7, 63
15, 45	24, 48	40, 160	27, 54

1. Nine inches is what part of a foot? Of a yard?
2. Two feet is what part of a yard?
3. One quart is what part of a gallon?
4. One pint is what part of a quart?
5. Three quarts is what part of a gallon?
6. Three pecks is what part of a bushel?
7. At 60¢ a pound, how much candy can I buy for 15¢?
8. What part of a pound of 40¢ candy can I buy for 10 cents?

SOME INTERESTING THINGS ABOUT FRACTIONS

<table>
<tr><td colspan="16">1</td></tr>
<tr><td colspan="8">$\frac{1}{2}$</td><td colspan="8">$\frac{1}{2}$</td></tr>
<tr><td colspan="4">$\frac{1}{4}$</td><td colspan="4">$\frac{1}{4}$</td><td colspan="4">$\frac{1}{4}$</td><td colspan="4">$\frac{1}{4}$</td></tr>
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</table>

Start with the fraction $\frac{3}{8}$ and see what happens to its value when you multiply one of its terms and then the other.

First multiply the numerator by 2. $\frac{3 \times 2}{8} = \frac{6}{8}$

Which is larger $\frac{3}{8}$ or $\frac{6}{8}$? How much larger?

Which would you rather have, $\frac{3}{8}$ or $\frac{6}{8}$ of a pound of chocolates? Why?

Multiplying the *numerator* of a fraction by a whole number *multiplies* the fraction.

Now multiply the denominator of $\frac{3}{8}$ by 2 and see what happens. $\frac{3}{8 \times 2} = \frac{3}{16}$

Which is smaller $\frac{3}{8}$ or $\frac{3}{16}$? How much smaller?

Would you trade $\frac{3}{8}$ for $\frac{3}{16}$ of a pound of chocolates? Why?

Multiplying the *denominator* of a fraction by a whole number *divides* the fraction.

Multiply the numerator of $\frac{3}{8}$ by 4; by 5; by 6. Tell whether each answer is larger or smaller than $\frac{3}{8}$ and how much larger or smaller.

Multiply the denominator of $\frac{3}{8}$ by 4; by 5; by 6. Tell whether each answer is larger or smaller than $\frac{3}{8}$ and how much larger or smaller.

Now start with $\frac{12}{16}$. See what happens to its value when you divide one of its terms, and then the other.

Divide the numerator of $\frac{12}{16}$ by 2. $\frac{12 \div 2}{16} = \frac{6}{16}$

Which is smaller $\frac{12}{16}$ or $\frac{6}{16}$? How much smaller?

Which would you rather have $\frac{12}{16}$ or $\frac{6}{16}$ of a pound of chocolates? Why?

> *Dividing the numerator* of a fraction by a whole number *divides* the fraction.

Now divide the denominator of $\frac{12}{16}$ by 2. $\frac{12}{16 \div 2} = \frac{12}{8}$

Which is larger $\frac{12}{16}$ or $\frac{12}{8}$? How much larger?

Would you trade $\frac{12}{16}$ for $\frac{12}{8}$ of a pound of chocolates? Why?

> *Dividing* the *denominator* of a fraction by a whole number *multiplies* the fraction.

Divide the numerator of $\frac{12}{16}$ by 2; by 4; by 6. Tell whether each answer is larger or smaller than $\frac{12}{16}$ and how much larger or smaller.

Divide the denominator of $\frac{12}{16}$ by 3; by 4; by 8. Tell whether each answer is larger or smaller than $\frac{12}{16}$ and how much larger or smaller.

Without canceling work each pair of examples. Change the answers to lowest terms, and tell which answer is the larger:

1. $\frac{2 \times 3}{9} =$	2. $\frac{8 \times 4}{36} =$	3. $\frac{5 \times 3}{24} =$	4. $\frac{3 \times 3}{27} =$
$\frac{2}{9 \div 3} =$	$\frac{8}{36 \div 4} =$	$\frac{5}{24 \div 3} =$	$\frac{3}{27 \div 3} =$
5. $\frac{8 \div 4}{16} =$	6. $\frac{6 \div 3}{9} =$	7. $\frac{5 \div 5}{15} =$	8. $\frac{2 \div 2}{3} =$
$\frac{8}{16 \times 4} =$	$\frac{6}{9 \times 3} =$	$\frac{5}{15 \times 5} =$	$\frac{2}{3 \times 2} =$

TEST IN FRACTIONS

Change these groups of fractions to fractions having the least common denominator:

1. $\frac{3}{8}, \frac{2}{3}, \frac{5}{6}$
2. $\frac{1}{6}, \frac{1}{9}, \frac{1}{12}$
3. $\frac{11}{16}, \frac{7}{8}, \frac{1}{4}$
4. $\frac{4}{5}, \frac{1}{2}, \frac{1}{3}$
5. $\frac{1}{10}, \frac{4}{9}, \frac{1}{6}$
6. $\frac{5}{6}, \frac{5}{8}, \frac{5}{12}$

Add:

1. $4\frac{2}{3} + 5\frac{1}{6} + 7\frac{11}{12}$
2. $\frac{7}{12} + \frac{2}{3} + \frac{7}{8}$
3. $9\frac{1}{5} + \frac{1}{6} + 1\frac{9}{10}$
4. $\frac{7}{8} + \frac{5}{6} + \frac{2}{3}$
5. $11\frac{1}{2} + 2\frac{1}{6} + 9\frac{1}{9}$
6. $\frac{1}{3} + \frac{1}{9} + \frac{1}{12}$

Subtract:

1. $11 - 7\frac{5}{8}$
2. $8\frac{5}{8} - 1\frac{3}{16}$
3. $13 - 2\frac{5}{12}$
4. $27\frac{1}{3} - 4\frac{5}{6}$
5. $18 - 6\frac{1}{5}$
6. $15\frac{1}{2} - 1\frac{9}{16}$
7. $19 - 4\frac{3}{10}$
8. $29\frac{3}{4} - 2\frac{2}{3}$
9. $30\frac{1}{2} - 12\frac{7}{8}$

Multiply:

1. $\frac{11}{16} \times 4$
2. $\frac{5}{6} \times \frac{2}{3}$
3. $\frac{3}{5} \times 5\frac{1}{6}$
4. $27 \times 9\frac{1}{6}$
5. $\frac{2}{5} \times \frac{9}{10}$
6. $\frac{7}{8} \times 16$
7. $\frac{2}{9} \times \frac{3}{8}$
8. $\frac{9}{16} \times \frac{1}{6}$
9. $28 \times 5\frac{3}{4}$
10. $21\frac{2}{3} \times 5$
11. $\frac{3}{4} \times 4\frac{2}{3}$
12. $24 \times 2\frac{7}{12}$

Divide:

1. $12 \div \frac{3}{4}$
2. $2\frac{2}{5} \div 4$
3. $3\frac{3}{4} \div \frac{2}{3}$
4. $9\frac{1}{2} \div 1\frac{1}{4}$
5. $\frac{9}{16} \div 1\frac{1}{4}$
6. $32 \div \frac{8}{9}$
7. $\frac{11}{12} \div 11$
8. $\frac{1}{4} \div 1\frac{3}{5}$
9. $\frac{4}{5} \div \frac{7}{8}$
10. $2\frac{7}{8} \div \frac{1}{4}$
11. $\frac{5}{6} \div \frac{1}{2}$
12. $\frac{3}{10} \div \frac{2}{5}$

A PROBLEM TEST

1. On Monday I worked $1\frac{3}{4}$ hours in the morning and $1\frac{1}{4}$ hours in the afternoon. How long did I work?

2. If it takes 4 hours to do a certain piece of work, and I have already worked $2\frac{1}{2}$ hours, how much time have I still to work?

3. When peas are selling at 70¢ a peck, how much must I pay for half a peck?

4. When sugar sells at $7\frac{1}{2}$¢ a pound, how many pounds can I buy for 75 cents?

5. Ten boys used 8 loaves of bread a day at their summer camp. At 10 cents a loaf, what was each boy's share of the cost per day?

6. Fred has four lawns to mow. If it takes on the average $1\frac{1}{2}$ hours to mow one, how long will it take to mow them all?

7. How long will it take you to walk to a place 10 miles distant, if you walk at the rate of $3\frac{1}{3}$ miles per hour?

8. How many pounds of potatoes are left in a 120-pound sack after $20\frac{1}{2}$ pounds have been taken out?

9. Mother bought 12 yards of goods and used $7\frac{1}{2}$ yards. How many yards were left?

10. A man earns $6.75 a day and puts $\frac{1}{3}$ of it in his savings account. How much does he save each day?

11. If a railroad ticket costs $2.70, how much will 2 tickets cost?

12. A boy pays 15¢ a day for riding to school on the trolley, and the same amount for riding home. How much does he spend for fares in 5 days?

UNITED STATES MONEY

We all have to spend money. Learn this table well. You need to know it when using money.

5¢ =	1 nickel
10¢ =	1 dime
50¢ =	1 half dollar
25¢ =	1 quarter dollar
100¢ =	1 dollar
10 dimes =	1 dollar

1. Add quickly. Give your answers in dollars and cents:

   1 dime + 1 nickel + 1 quarter
   2 nickels + 1 quarter + 1 half dollar
   3 cents + 1 half dollar + 4 dimes
   1 dollar + 2 quarters + 2 nickels

2. Have you ever seen articles in a store window marked 98¢? How much less than a dollar is this? $1.98 is almost what sum? $2.98? $4.99?

3. If you saved a nickel a week, how much money would you save in a year? How much would you have if you saved a dime each week for a year?

4. One hospital tag day, Molly and Louise sold tags down town. Here are the coins and bills received. Change them to dollars and cents and tell how much the girls brought in.

1,094 pennies	196 quarters
496 nickels	24 half dollars
875 dimes	14 dollar bills

BUYING SCHOOL SUPPLIES

1. The supplies for the first grade cost about 45¢ per pupil for a year. Find how much the supplies would cost for a first grade class of 36 pupils.

2. The supplies for a second grade cost about 50¢ per pupil for a year. How much more would supplies for a second grade class of 36 pupils cost than for a first grade class of the same size at 45¢ per pupil?

3. The third grade supplies cost about 80¢ per pupil for a year. What would be the total cost of supplies for a third grade class of 38 pupils for a year?

4. The supplies for a fourth grade class cost about one dollar per pupil a year. How much more do supplies for a fourth grade class of 38 pupils cost than for a third grade class of the same size at 80¢ a pupil?

5. The supplies for a fifth grade class cost about $1.30 per pupil for a year. How much would the supplies for a class of 40 pupils cost? How much more do supplies for a fifth grade class of 40 pupils cost than for a fourth grade class of the same size at $1.00 a pupil?

6. Arithmetic books for a fifth grade class cost $23.10. If there are 35 pupils in the class, what is the average cost per pupil?

7. What do the supplies for your grade cost a year?

DECIMAL FRACTIONS

$\$\frac{1}{4}$ is the same as \$.25 which is read 25 cents. \$.25 means 25 of the 100 cents in a dollar or $\frac{25}{100}$ of one dollar. .25 is read *25 hundredths.* Read .36; .48; .17.

You know that $\$\frac{1}{2}$ and \$.50 mean the same thing as 50 cents. \$.50 means 50 of the 100 cents in a dollar or $\frac{50}{100}$ of one dollar. .50 is read *50 hundredths.*

$\frac{1}{2}$ and .50 are fractions. $\frac{1}{4}$ and .25 are fractions.

Fractions like $\frac{1}{2}$ and $\frac{1}{4}$ are called *common fractions.*

Fractions like .25 and .50 are called *decimal fractions.* We usually speak of them as *decimals.*

Fractions whose denominators are 10, 100 or 1000 may be written as decimal fractions.

$\frac{3}{10} = .3$	Both fractions are read *three tenths.*
$\frac{37}{100} = .37$	$\frac{37}{100}$ is read *thirty-seven one-hundredths.* .37 is read *thirty-seven hundredths.*
$\frac{397}{1000} = .397$	$\frac{397}{1000}$ is read *three hundred ninety-seven one-thousandths.* .397 is read *three hundred ninety-seven thousandths.*

When there is one figure at the right of the decimal point, we say the decimal has *one place.* .3

When there are two figures at the right of the decimal point, we say the decimal has *two places.* .37

When there are three figures at the right of the decimal point, we say the decimal has *three places.* .397

The decimal point is always written at the left of a decimal fraction, as in .48. The decimal point shows that the number is a decimal fraction.

DECIMALS

A whole number and a decimal written together make a *mixed decimal.* Below the diagram is a mixed decimal. The names of the first three decimal places to the right of the decimal point are shown above the figures.

Hundreds	Tens	Units	**Decimal Point**	Tenths	Hundredths	Thousandths
3	2	1	.	1	2	3

This number is read 321 and 123 thousandths. In a mixed decimal, the decimal point is read *and.*

1 place to the right of the decimal point means tenths.

2 places to the right of the decimal point means hundredths.

3 places to the right of the decimal point means thousandths.

When we write $\frac{3}{100}$ as a decimal fraction, we place the 3 in hundredth's place and a zero in tenth's place to show there are no tenths. .03

When we read decimals, we begin at the left and first read the number and then give the name of the last decimal place on the right. .049 is read forty-nine thousandths.

Read these decimals; write them as common fractions:

.5 .75 .243 .05 .005 .9

Write these common fractions as decimals:

$\frac{45}{100}$ $\frac{9}{10}$ $\frac{9}{100}$ $\frac{137}{1000}$ $\frac{59}{100}$ $\frac{9}{1000}$

Read these mixed decimals:

4.5 27.3 39.45 115.04 4.597

Write these mixed numbers as mixed decimals:

$2\frac{7}{10}$ $23\frac{9}{100}$ $109\frac{1}{10}$ $4\frac{39}{100}$ $1095\frac{4}{1000}$

Which of these numbers is the largest? The smallest?

4.975 49.75 497.5 4975

Read the following numbers:

1.	.8	9.	.11	17.	650.4
2.	.12	10.	36.05	18.	94.75
3.	4.25	11.	16.251	19.	6.294
4.	.9	12.	198.36	20.	.003
5.	.07	13.	4.65	21.	45.45
6.	36.35	14.	75.5	22.	165.8
7.	9.166	15.	.965	23.	1.215
8.	124.7	16.	16.61	24.	.845

Write as decimals or mixed decimals:

1. Nine tenths.
2. Five and four tenths.
3. Twenty and twelve hundredths.
4. Six and one hundred sixty-two thousandths.
5. One hundred twenty and ninety-seven hundredths.
6. Seventy and twenty-seven hundredths.
7. Eight hundred one and seven hundredths.
8. Seven hundred eighty-one thousandths.

ADDING DECIMALS

One day Fred rode his bicycle .75 miles before school, 1.25 miles at noon and 3.75 miles after school. How far did he ride in all?

How to Add Decimals

$$\begin{array}{r} .75 \\ 1.25 \\ 3.75 \\ \hline 5.75 \end{array}$$

Decimals are added in the same way that dollars and cents are added. Be sure that the decimal points are under each other. Write the decimal point in the answer under the decimal points in the addends.

Fred rode 5.75 miles.

1. .1 + .2
2. .08 + .01
3. .007 + .002
4. .3 + .03
5. .4 + .02 + .801
6. 9.875 + .608 + 16.9 + .55
7. 6.7 + .89 + 8.9 + 45.66
8. .60 + 7.94 + .8 + 6.078
9. 46 + 4.78 + 17.85 + .689
10. 7.76 + .84 + 9.08 + 647
11. 29.405 + 31.47 + 46.869 + 25.47
12. 3.792 + 425.88 + 764.42 + 337.95
13. 27.05 + .05 + 4.96 + .39 + 91.8
14. 65.74 + .02 + 7.35 + 76.8 + .87
15. 43.83 + 33.25 + 2.3 + .45 + 28.06
16. 10.1 + 102.13 + 612.64 + 42.65 + .3
17. 90.57 + 5.41 + 20.20 + .09 + 57.30
18. 79.89 + 96.09 + 7.7 + 46.59 + .84

AUTOMOBILE TOURS

1. It is 44.1 miles from Augusta, Me., to Poland Springs, Me., 27.4 miles from Poland Springs to Portland, Me., 54.8 miles from Portland to Portsmouth, N. H., 21.8 miles from Portsmouth to Newburyport, Mass., and 36.2 miles from Newburyport to Boston, Mass. What is the distance from Augusta, Me., to Boston, Mass.?

2. It is 60.6 miles from New York City to Newburgh, 33.6 miles from Newburgh to Kingston, and 66 miles from Kingston to Grand Gorge (Catskill Mountains). What is the distance from New York to Grand Gorge, N. Y.?

3. From Detroit, Mich., to Kalamazoo, Mich., is 140.7 miles, from Kalamazoo to Michigan City, Ind., is 90 miles, from Michigan City to Chicago, Ill., it is 55.8 miles, from Chicago to Milwaukee, Wis., it is 93.6 miles. How far is it from Detroit to Chicago? From Detroit to Milwaukee?

4. On the Dixie Highway it is 93.7 miles from Atlanta, Ga., to Macon, Ga., 175.3 miles from Macon to Waycross, Ga., 82.8 miles from Waycross to Jacksonville, Fla., 41.1 miles from Jacksonville to St. Augustine, Fla., 68.9 miles from St. Augustine to Daytona Beach, Fla., 269.1 miles from Daytona Beach to Miami, Fla. Find the distance from Atlanta, Ga., to Miami, Fla.

5. It is 170.6 miles from Fort Worth, Texas, to Abilene, 43.4 miles from Abilene to Sweet Water, and 378 miles from Sweet Water to El Paso, Texas. Find the distance from Fort Worth to El Paso.

6. It is 146.1 miles from New York to Pittsfield, Mass., 55.6 miles from Pittsfield to Greenfield, Mass., and 163.6 miles from Greenfield to Bretton Woods, N. H. How far is it from New York to Bretton Woods?

SUBTRACTING DECIMALS

A light truck weighed .75 of a ton. When loaded with apples it weighed 1.67 tons. How much did the apples weigh?

How to Subtract Decimals

$1.67 - .75 =$

$$\begin{array}{r} 1.67 \\ .75 \\ \hline .92 \end{array}$$

Decimals are subtracted in the same way that dollars and cents are subtracted. Be sure that the decimal points are under each other.

Write the decimal point in the answer under the decimal points above.

The apples weighed .92 tons.

When the minuend is a whole number or contains fewer decimal places than the subtrahend, zeros must be added to the right until the minuend has as many decimal places as the subtrahend.

$87 - .372 =$

$$\begin{array}{r} 87.000 \\ .372 \\ \hline 86.628 \end{array}$$

$40.5 - 12.25 =$

$$\begin{array}{r} 40.50 \\ 12.25 \\ \hline 28.25 \end{array}$$

Remember: Adding or taking away zeros to the right of a decimal does not change its value.

Copy and subtract:

1. 11.28 — 6.5	2. 4.034 — 3.92	3. 159.1 — 88.333
4. 49.75 — 21.45	5. 18.61 — 16.617	6. 1.435 — .912
7. 8.763 — 5.745	8. 96.15 — 5.922	9. 16.901 — 8.5
10. 89.223 — 36.29	11. 126.242 — 72.78	12. 73.6 — 57.171
13. .798 — .046	14. 79.925 — 28.14	15. 85 — 16.535
16. 72.586 — 50.62	17. 147.94 — 71.61	18. 15.41 — 8.572
19. 65.8 — 41.03	20. 132.81 — 62.75	21. 66 — .787
22. 7.861 — 3.383	23. 53.97 — 38.29	24. 14.33 — 4.832

USING A RAILROAD TIME-TABLE

Tom Ward, who lives in Richmond, Va., went with his father to Jacksonville, Fla. They made the journey by the Seaboard Air Line, leaving at 12:50 P. M.

The following table shows the distance of the principal stations from Richmond, and also shows the time that Tom's train reached each station:

Miles from Richmond		Hour of Arrival
0	Richmond, Va.	12:50 P. M.
22.7	Petersburg, Va.	1:32
98.2	Norlina, N. C.	3:55
113.4	Henderson, N. C.	4:31
157.2	Raleigh, N. C.	5:57
199.3	Sanford, N. C.	7:20
225.2	Southern Pines, N. C.	8:05
253.8	Hamlet, N. C.	9:05
326.8	Camden, S. C.	11:25
359.7	Columbia, S. C.	12:25 A. M.
501.6	Savannah, Ga.	4:50
639.6	Jacksonville, Fla.	9:15

1. Beginning with Richmond find the distance from each station to the next.

2. How far is it from Raleigh to Hamlet?

3. How far is it from Raleigh to Columbia?

4. How far is it from Raleigh to Jacksonville?

5. How far is it from Petersburg to Savannah?

6. How far is it from Southern Pines to Jacksonville?

7. How much later does the train arrive at Norlina than at Petersburg? At Camden than at Norlina? At Jacksonville than at Savannah?

CHANGING DECIMALS TO FRACTIONS

Change .5, .25 and .125 to common fractions.

How to Change a Decimal Fraction to a Common Fraction	
$.5 = \frac{5}{10} = \frac{1}{2}$ $.25 = \frac{25}{100} = \frac{1}{4}$ $.125 = \frac{125}{1000} = \frac{1}{8}$	Write the decimal as a common fraction. Reduce it to lowest terms.

Change 4.5 to a mixed number:

How to Change a Mixed Decimal to a Mixed Number	
$4.5 = 4\frac{5}{10} = 4\frac{1}{2}$	Write the decimal part of the mixed decimal as a fraction. Use the fraction in place of the decimal.

Change to fractions or mixed numbers:

1. .2	**5.** .05	**9.** .75	**13.** .155
2. .8	**6.** .15	**10.** .005	**14.** .175
3. .4	**7.** .35	**11.** .025	**15.** .325
4. 4.6	**8.** 6.05	**12.** 8.75	**16.** 20.125

Tell which is the larger:

.5 or $\frac{2}{5}$	.25 or $\frac{3}{16}$	.9 or $\frac{4}{5}$
.25 or $\frac{1}{3}$	.8 or $\frac{3}{5}$	.2 or $\frac{1}{4}$

1. Which would cost more, $\frac{4}{5}$ of a pound of candy or .7 of a pound?

2. Mary walks .6 of a mile to school. Dorothy walks $\frac{4}{5}$ of a mile. Which one walks farther?

CHANGING FRACTIONS TO DECIMALS

Change $\frac{3}{4}$ and $\frac{2}{3}$ to decimals.

How to Change a Common Fraction to a Decimal

$$\frac{3}{4} = 3 \div 4 = 3.00 \div 4$$

$$4\overline{)3.00}\ \ \text{quotient } .75$$

$$\frac{2}{3} = 2 \div 3 = 2.00 \div 3$$

$$3\overline{)2.00}\ \ \text{quotient } .66\tfrac{2}{3}$$

Place a decimal point after the numerator.
Add one or more zeros.
Divide by the denominator.

When there is a remainder it may be written as a common fraction.

Change these common fractions to decimals:

1. $\frac{1}{4}$	5. $\frac{3}{5}$	9. $\frac{1}{3}$	13. $\frac{1}{10}$
2. $\frac{1}{8}$	6. $\frac{4}{5}$	10. $\frac{3}{8}$	14. $\frac{3}{10}$
3. $\frac{1}{5}$	7. $\frac{1}{6}$	11. $\frac{5}{8}$	15. $\frac{5}{12}$
4. $\frac{2}{5}$	8. $\frac{5}{6}$	12. $\frac{7}{8}$	16. $\frac{1}{16}$

Change $5\frac{1}{4}$ to a mixed decimal:

How to Change a Mixed Number to a Mixed Decimal

$$5\tfrac{1}{4} = 5 + \tfrac{1}{4}$$

$$\tfrac{1}{4} = 4\overline{)1.00}\ \ \text{quotient } .25$$

Change the fraction of the mixed number to a decimal and use the decimal in place of the fraction.

$5\frac{1}{4} = 5.25$

Change these mixed numbers to mixed decimals:

1. $5\frac{1}{2}$	4. $6\frac{7}{8}$	7. $4\frac{2}{5}$	10. $16\frac{5}{8}$
2. $7\frac{1}{4}$	5. $9\frac{1}{5}$	8. $2\frac{4}{5}$	11. $13\frac{5}{6}$
3. $5\frac{3}{4}$	6. $8\frac{2}{5}$	9. $7\frac{2}{3}$	12. $18\frac{1}{3}$

UNCLE SAM'S MAIL SERVICE

Uncle Sam has a wonderful mail service. Almost everything up to a certain size can be sent by mail. The regular mail and the parcel post service handle all.

Letters, papers, magazines, and packages that weigh eight ounces or less, are divided into first, second, and third-class mail, and are paid for by weight at so much for each ounce, according to the class to which they belong.

If you live in a city, all of these three classes of mail are brought to your door by the regular postman. If you live in the country, somewhere near a city or town, a rural free delivery postman brings you, not only the regular mail, but also all parcel post packages.

Packages that weigh more than eight ounces are sent by parcel post. This is called fourth-class mail.

The parcel post charge depends on two things, the weight of the package and the distance it has to go.

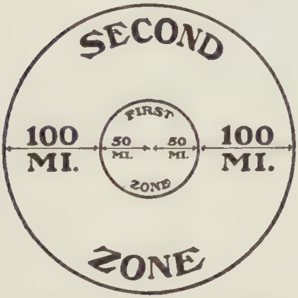
Each fraction of a pound sent by parcel post is charged for as if it weighed a full pound. To send nine ounces costs as much as to send a pound. To send $1\frac{1}{4}$ pounds costs as much as to send two pounds.

Besides these charges, the sender must pay an added 2¢ on each package, called a service charge, unless the package is mailed on a rural free delivery route, when no service charge is added.

To figure the charge for distance, each post office is thought of as a starting point and its town or city is called the Local Zone.

All places outside the Local Zone but within 50 miles of the post office are in what is called the First Zone.

The Second Zone is 100 miles wide and includes all places outside the First Zone and within 150 miles of the post office where the parcel is mailed. The Third Zone is 150 miles wide. In all there are eight zones outside of the Local Zone.

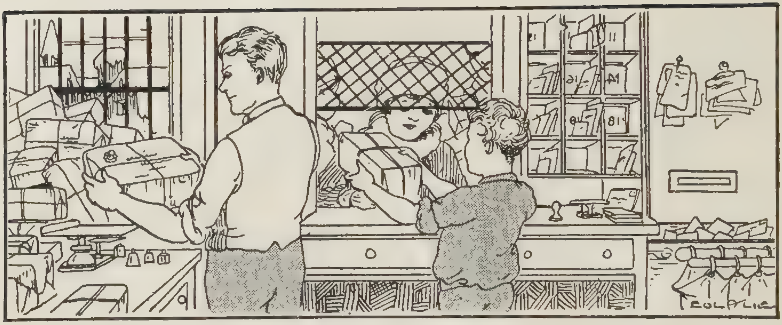


PARCEL POST ZONES

If you mail a package by parcel post, the postal clerk weighs it and finds from the address into what zone it is going. Then he looks at his mailing chart, finds the parcel's weight in the first column, follows across the chart to the right zone and reads the amount of postage written there. To this he adds the 2¢ service charge. You pay for the stamps and off goes your package.

PARCEL POST CHARGES

Weight in pounds	Local Zone	1st, up to 50 miles	2nd, 50 to 150 miles	3rd, 150 to 300 miles	4th, 300 to 600 miles	5th, 600 to 1000 miles	6th, 1000 to 1400 miles	7th, 1400 to 1800 miles	8th, over 1800 miles
1	$0.05	$0.05	$0.05	$0.06	$0.07	$0.08	$0.09	$0.11	$0.12
2	.06	.06	.06	.08	.11	.14	.17	.21	.24
3	.06	.07	.07	.10	.15	.20	.25	.31	.36
4	.07	.08	.08	.12	.19	.26	.33	.41	.48
5	.07	.09	.09	.14	.23	.32	.41	.51	.60
6	.08	.10	.10	.16	.27	.38	.49	.61	.72
7	.08	.11	.11	.18	.31	.44	.57	.71	.84
8	.09	.12	.12	.20	.35	.50	.65	.81	.96
9	.09	.13	.13	.22	.39	.56	.73	.91	1.08
10	.10	.14	.14	.24	.43	.62	.81	1.01	1.20



SENDING PACKAGES BY PARCEL POST

Paul's father is the postmaster at Orchard Grove. At Christmas time Paul helped his father with the packages. Paul weighed and stamped these packages himself.

1. James sent a 5-pound parcel to a place in the first zone. How much did the postage cost?

2. Ruth sent a parcel that weighed 3 lb. 5 oz. to a place in the third zone. Find the cost of the postage.

3. William mailed three parcels. One weighed 2 lb. 8 oz. and was sent to a place in the first zone. One weighed $1\frac{3}{4}$ lb. and was sent to a place in the third zone. The other weighed 5 lb. and was sent to a person in the local zone. What was the whole amount paid for postage?

4. Mary mailed four parcels. One weighed 9 ounces. Another weighed 7 lb. Both of these were sent to places in the first zone. One weighed $2\frac{1}{4}$ lb. and was sent to a place in the second zone. The other weighed 9 lb. 3 oz. and was sent to a place in the third zone. How much did she pay for postage?

5. How much more would it cost to send a $6\frac{3}{4}$ lb. parcel to a place 140 miles distant than to a place 25 miles distant?

MULTIPLYING DECIMALS

You know that $5 \times \$.25 = \$1.25$.

$\$.25 = .25$ of a dollar, so $5 \times .25 = 1.25$.

By using common fractions you can prove for yourself that this is correct.

$$\begin{array}{r} .25 \\ 5 \\ \hline 1.25 \end{array} \qquad \begin{array}{l} 5 \times .25 = 5 \times \frac{25}{100} = \frac{125}{100} \\ \frac{125}{100} = 1\frac{25}{100} = 1.25 \end{array}$$

When you multiply $5 \times .25$ there are two decimal places in the numbers multiplied together and two decimal places in the product.

Multiply $.2 \times .4$.

$.2 \times .4 = \frac{2}{10} \times \frac{4}{10} = \frac{8}{100} = .08$

When you multiply $.2 \times .4$ there is a decimal place in each of the numbers multiplied together and there are 2 decimal places in the product.

In multiplying decimals, then, always point off from the right as many decimal places in the product as there are decimal places in both the multiplicand and the multiplier.

When there are more decimal places to be pointed off than there are figures in the product, add, right after the decimal point, as many zeros as are needed to make the required number of decimal places. $.16 \times .3 = .048$.

When the product ends with a zero, it may be dropped after you have pointed off the correct number of decimal places. $.2 \times .35 = .070 = .07$. $\frac{70}{1000} = \frac{7}{100}$

Multiply:

$4 \times .6$	$5 \times .3$	7×1.1	$6 \times .9$
$.3 \times .7$	$.41 \times .7$	$.4 \times .22$	$.2 \times .2$
$.3 \times .12$	$.4 \times .5$	$1.2 \times .5$	$.8 \times .7$

MULTIPLYING A DECIMAL BY A WHOLE NUMBER

On a long trip Mr. Rogers drove his automobile for 5 days at the rate of 212.25 miles per day. What was the length of the trip?

How to Multiply a Decimal by a Whole Number

$212.25 \times 5 =$

$$\begin{array}{r} 212.25 \\ 5 \\ \hline 1061.25 \end{array}$$

Decimals are multiplied by whole numbers in the same way that dollars and cents are multiplied by whole numbers.

Point off from the right as many decimal places in the product as there are decimal places in both the multiplicand and the multiplier.

The length of the trip was 1061.25 miles.

Copy and multiply:

1. 76.95 × 9	2. 978.6 × 5	3. 6.879 × 4	4. 80.75 × 8	5. 6.868 × 8
6. 40.896 × 87	7. 7.798 × 56	8. 806.7 × 49	9. 46.414 × 87	10. 844.8 × 99
11. 2.980 × 75	12. 90.87 × 67	13. 7.075 × 89	14. 859.6 × 76	15. 39.57 × 708
16. 621.52 × 726	17. 76.50 × 98	18. 98.08 × 706	19. 73.993 × 8	20. 8.921 × 809
21. 3.257 × 307	22. 21.34 × 269	23. 84.213 × 18	24. 431.5 × 45	25. 74.83 × 409
26. 4.141 × 37	27. 246.1 × 103	28. 987.06 × 32	29. 75.902 × 41	30. 356.4 × 79

MULTIPLYING A DECIMAL BY A DECIMAL

During a poor season a farmer raised only 96.5 bushels of potatoes on an acre of ground. At that rate, how many bushels did he raise on 4.22 acres?

How to Multiply a Decimal by a Decimal

$96.5 \times 4.22 =$

```
   96.5
   4.22
  -----
   1930
  1930
 3860
-------
407.230
```

In multiplying decimals, point off from the right as many decimal places in the product as there are decimal places in both the multiplicand and the multiplier. After you have pointed off the right number of decimal places, any zeros at the right of the answer may be dropped.

The farmer raised 407.23 bushels.

Copy and multiply:

1.	7.4×68.69	11.	5.8×780.6
2.	8.5×708.8	12.	9.6×80.98
3.	9.6×78.09	13.	$.05 \times 715.1$
4.	4.79×87.6	14.	97.6×77.98
5.	$.09 \times 2534.4$	15.	9.08×445.3
6.	8.67×68.96	16.	4.4×98.08
7.	78.6×8.94	17.	70.6×89.78
8.	97.8×97.06	18.	73.6×40.02
9.	6.07×4375.2	19.	70.5×101.51
10.	76.6×90.88	20.	80.8×997.6

1. If you drove your car for 3.6 hours at the rate of 15.75 miles per hour, how far would you go?

2. A steamer that travels at the rate of 17.3 miles per hour takes .6 of an hour to go from one end of the lake to the other. What is the length of the lake?

USING DECIMALS IN PROBLEMS

1. John's bicycle weighs 36.25 pounds. How much would 4 bicycles weigh at this rate?

2. The distance from Ruth's home to Mary's home is 2.6 miles. How long is the round trip?

3. Frank bought 4 baskets of peaches at $.75 a basket. How much did all cost?

4. Sarah took twelve music lessons that cost $1.50 each. How much did the twelve lessons cost?

5. At $2.30 a day, how much will a boy earn in 8.5 days?

6. If a train is traveling at an average rate of 48.85 miles an hour, how far will it go in 90 hours?

7. A cross-country race course is 5.25 miles long. John ran over the course every day for 14 days. How far did he run?

8. There are 5280 feet in a mile. If an aviator goes up to an elevation of 2.4 miles, how many feet high does he go?

9. It is 12.75 miles from Lewiston to Lewiston Junction. The trolley that runs between the two places travels this distance 10 times a day. How far does it go in a day? In a hundred days?

10. Mr. Wait says his cost for automobile tires is $.006 for each mile he drives. What would be the cost for tires on a trip of 825 miles?

11. At $1.35 a yard, how much will 12 yards of cloth cost?

12. An automobile travels at the average rate of 32.75 miles an hour. How far will it go in 12 hours?

13. Mr. Long has a fishing rod that weighs $.37\frac{1}{2}$ of a pound. How much would 3 rods like this weigh?

14. The average weight of each member of a football team is 159.25 pounds. What is the total weight of the 11 members?

15. At an average expense of \$.022 per mile for gasoline, how much does the gasoline for an 850 mile trip cost?

16. A sight-seeing automobile carried 2325 passengers during the week. Each passenger paid \$.75. How much money was collected for fares?

WHAT MUST YOU KNOW TO COMPLETE THESE PROBLEMS?

1. Mr. Hunter drove his car 216.8 miles on Tuesday. How many miles did he average per hour?

2. A driver used 100 gallons of gasoline in an automobile race. How many miles did he drive per gallon?

3. Our basket ball team beat the Lincoln team by 9 points. How many points did we score?

4. At a sale Mrs. Green bought two pairs of gloves for $1\frac{1}{3}$ times the regular price of one pair. What was the regular price for one pair?

5. Bob can run a hundred yards $\frac{2}{5}$ of a second faster than Bill. How fast can Bill run?

6. Alice collected the money and bought class pins for her class. She paid \$45 for them. What was the cost of each pin?

PROBLEMS OF THE STORE

Albert helped his father in the grocery store. Here are six problems he had to work using fractions.

In these problems if an answer ends in a fraction that is $\frac{1}{2}$¢ or more, drop the fraction and add 1¢ to the answer. Drop the fraction if it is less than $\frac{1}{2}$¢. This is the common business practice in making out bills.

1.
   - 4 lb. butter at 52¢
   - 8 lb. sugar at $7\frac{1}{2}$¢
   - $\frac{3}{4}$ lb. cheese at 36¢
   - $8\frac{1}{2}$ lb. potatoes at 6¢
   - 6 cans of corn at 22¢

2.
   - $1\frac{3}{4}$ lb. cheese at 40¢
   - 6 lb. apples at $12\frac{1}{2}$¢
   - 3 lb. butter at 49¢
   - $10\frac{1}{2}$ doz. eggs at 38¢
   - $\frac{3}{4}$ lb. cookies at 32¢

3.
   - 16 cans of soup at $12\frac{1}{2}$¢
   - $7\frac{1}{4}$ lb. butter at 45¢
   - 9 lb. prunes at 14¢
   - $10\frac{1}{2}$ lb. rice at 8¢
   - 6 eggs at 50¢ a dozen

4.
   - 12 cans of peas at $16\frac{2}{3}$¢
   - 10 lb. sugar at $6\frac{1}{2}$¢
   - 10 oranges at 48¢ a doz.
   - $\frac{3}{4}$ lb. cheese at 38¢
   - $2\frac{1}{4}$ lb. crackers at 12¢

5. A boy came into the store and asked for 15¢ worth of candy that sold for 60¢ a pound. What part of a pound should Albert have given him?

6. Apples were selling at the rate of 3 lb. for 19¢. At another store the price was 4 lb. for a quarter. At which store were apples cheaper?

MULTIPLYING DECIMALS BY 10, 100 AND 1000

You have learned to multiply by 10, 100 and 1000 by annexing zeros.

$10 \times 4 = 40$ $\qquad$ $1000 \times 41 = 41{,}000$

You have learned that when you multiply decimals you point off from the right as many places as there are decimal places in both the multiplicand and the multiplier.

$10 \times .4 = 4.0$ $\qquad$ $1000 \times .41 = 410.00$

To multiply decimals by 10, 100 or 1000 move the decimal point one place to the right for each zero in the multiplier, annexing zeros if necessary.

The Quick Way	The Longer Way
$10 \times .4 = 4.$	$10 \times .4 = 4.0$
$100 \times .41 = 41.$	$100 \times .41 = 41.00$
$1000 \times .41 = 410.$	$1000 \times .41 = 410.00$

Multiply each of these numbers by 10:

.6	.06	60.6	.015	.15	60.15

Multiply each of these numbers by 100:

.25	.4	2.6	.75	.075	6.075

Multiply each of these numbers by 1000:

.5	5.5	.375	1.125	.66	.666
.12	7.2	.42	3.26	.029	.77

1. A dealer bought 10 new window signs at \$.25 apiece. How much did the 10 cost?

2. The lunch stand at the fair sold 1000 sandwiches at \$.10 each. How much was paid for the sandwiches?

3. A factory charged \$.125 apiece for collars. At that rate how much would 10 collars cost? 100 collars?

SALES SLIPS

Most stores make out sales slips for the articles sold. A sales slip is a bill made out at the time of the purchase. When the sale is for cash, no name is written on the sales slip. If the articles are to be charged, the name and address of the customer are written at the top of the slip.

D. W. ADAMS COMPANY

Augusta, Maine, Oct. 8, 192

Mrs. A. T. Jones

Street 986 Monroe St.

City

Clerk No.	Ordered by	Am't Rec'd
43	Mary Jones	

1	sweater @ 2.95	2	95
3	handkerchiefs @ 35¢	1	05
		4	00

In most large stores, the clerk also writes the name of the person giving the order. If Mary Jones is having something charged to her mother, Mrs. A. T. Jones, the clerk writes Mary Jones under the heading "ordered by."

By using carbon paper, a duplicate copy of the sales slip is made for the customer. The original copy is kept for the bookkeeping department of the store.

With your ruler make 4 blank copies of this sales slip and fill in two of them with these cash sales:

1. 16 spools of thread at 8¢
   23 yards of ribbon at 9¢
   12 towels at 16¢
2. 6 yards of silk at $1.25
   2 pr. of gloves at $1.98
   11 yards of lace at 62¢

Make up purchases to fill in the other sales slips you made.

MAKING OUT BILLS

When a bill for purchases which were charged is made out by the bookkeeping department of a store, the dates of the purchases are written at the left. A bill for purchases made at different times is sometimes called a *statement.*

D. W. ADAMS COMPANY

Augusta, Maine, Jan. 1, 1927

SOLD TO Mrs. E. T. Flagg

406 Hampton St.

Dec. 3	4 handkerchiefs	@.35	1.40	
7	8 yd. ribbon	@.15	1.20	
15	1 sled		4.50	
21	1 doll		3.98	11.08

Make believe you are running a grocery store and make out bills for these sales. Draw lines on a sheet of paper so it will look like Mrs. Flagg's bill.

1. 7 lb. rice at 8¢
   5 lb. lard at 21¢
   $2\frac{1}{2}$ lb. cheese at 23¢

2. 20 lb. sugar at $6\frac{1}{2}$¢
   $2\frac{1}{2}$ lb. coffee at 59¢
   6 pkg. raisins at 13¢

3. $2\frac{1}{2}$ lb. beans at 16¢
   $2\frac{1}{4}$ lb. cheese at 27¢
   $\frac{1}{2}$ lb. tea at 70¢

4. 8 cans soup at 11¢
   23 cans peaches at 24¢
   $3\frac{1}{2}$ lb. butter at 48¢

5. 4 pkg. oatmeal at 11¢
   1 doz. oranges at 55¢
   2 loaves bread at 12¢

6. $\frac{3}{4}$ lb. cake at 48¢
   2 bars soap at 7¢
   3 lemons at 4¢

DIVIDING A DECIMAL BY A WHOLE NUMBER

A contractor has .75 of a mile of paving to finish. How much must he do each day to finish in 5 days? To finish in 15 days?

How to Divide a Decimal by a Whole Number

$$5\overline{)\,.75}^{\;.15}$$

Decimals are divided by whole numbers in the same way that dollars and cents are divided by whole numbers. Before starting to divide write the decimal point in the quotient over the decimal point in the dividend.

$$\begin{array}{r} .05 \\ 15\overline{)\,.75} \\ 75 \\ \hline \end{array}$$

If there are vacant places between the decimal point and the first figure of the quotient, write a zero in each place.

He must pave .15 of a mile each day to finish in 5 days or .05 of a mile each day to finish in 15 days.

Copy, divide and prove:

1.	7.5 ÷ 5	11.	.648 ÷ 36	21.	8.82 ÷ 21
2.	14.2 ÷ 2	12.	46.2 ÷ 11	22.	61.2 ÷ 51
3.	44.8 ÷ 8	13.	7.59 ÷ 23	23.	7.41 ÷ 39
4.	47.7 ÷ 9	14.	.625 ÷ 25	24.	26.4 ÷ 22
5.	.54 ÷ 6	15.	68.2 ÷ 31	25.	.132 ÷ 12
6.	12.75 ÷ 25	16.	.912 ÷ 76	26.	10.37 ÷ 17
7.	3.225 ÷ 15	17.	90.1 ÷ 53	27.	46.17 ÷ 81
8.	.578 ÷ 17	18.	.342 ÷ 19	28.	20.74 ÷ 17
9.	5.25 ÷ 35	19.	37.7 ÷ 13	29.	.544 ÷ 32
10.	20.16 ÷ 16	20.	3.63 ÷ 33	30.	1.134 ÷ 81

DIVIDING A MIXED DECIMAL BY A WHOLE NUMBER

Two families drove 129.2 miles to the seashore. One family drove in 8 hours. The other family had tire trouble and it took them 16 hours. How many miles per hour did each family average?

How to Divide a Mixed Decimal by a Whole Number

$$\begin{array}{r} 16.15 \\ 8\overline{)129.20} \end{array}$$

Place the decimal point in the quotient over the decimal point in the dividend and divide.

$$\begin{array}{r} 8.075 \\ 16\overline{)129.200} \\ \underline{128} \\ 1\,20 \\ \underline{1\,12} \\ 80 \\ \underline{80} \end{array}$$

When there is a remainder, zeros may be added to the dividend and the division carried on. This will sometimes give you a quotient with no remainder.

The first family averaged 16.15 miles per hour, and the second 8.075 miles per hour.

Remember: Adding or taking away zeros to the right of a decimal does not change its value.

Divide:

$4\overline{)50.2}$	$6\overline{)196.5}$	$14\overline{)70.7}$	$18\overline{)830.7}$
$5\overline{)1.61}$	$8\overline{)19.6}$	$12\overline{)1.86}$	$15\overline{)39.06}$

1. Mrs. Rose paid $1.50 for 5 bread-pans. How much did they cost apiece?

2. When 5 collars can be bought for $.75, how much does each collar cost?

3. A ten-trip railroad ticket cost $3.20. How much did each ride cost?

4. Six rose buds cost $.90. What was the cost of each one?

5. The grocer put up a sign offering for sale 9 cans of peas for $1.50. What was the price per can?

6. John spent $5.25 for 15 packages of seed. What was the average cost of each package?

7. George rode 187.2 miles on his bicycle in 16 hours. What was his average speed per hour?

8. A sewing teacher bought 67.5 yards of gingham and cut it into 30 equal pieces from which to make aprons. How many yards were there in each apron?

9. If 22.5 pounds of candy were divided equally among 45 children, what part of a pound did each child receive?

10. A newsdealer bought pencils at $4.32 a gross. How much did the pencils cost apiece?

11. If a man's income for 30 days amounts to $172.50, what is his daily income?

12. A girl paid $8.05 for 7 yards of ribbon. How much did it cost a yard?

13. Six children went to a picnic. Their expenses were $8.40. They divided the expenses equally. How much did each child pay?

14. Joseph worked 5 days and was paid $14.50. How much did he earn a day?

15. Henry keeps hens and sells the eggs. One week he was paid $2.08 for 8 dozen eggs. How much did he charge per dozen?

16. A school ball team rode on the train to a neighboring city to play a match game. The tickets for 9 players cost $54.72. How much did each ticket cost?

DIVIDING A WHOLE NUMBER BY A DECIMAL

A farmer made 7 gallons of maple syrup. How many bottles, each holding .2 of a gallon could he fill? How many cans, each holding 1.4 gallons, could he fill?

How to Divide a Whole Number by a Decimal

$$.2\overline{)7} = 2\overline{)70.}$$

$$\begin{array}{r} 35. \\ 2\overline{)70.} \end{array}$$

$$1.4\overline{)7} = 14\overline{)70.}$$

$$\begin{array}{r} 5. \\ 14\overline{)70.} \\ \underline{70} \end{array}$$

Write the example over again, making the divisor a whole number and adding as many zeros to the dividend as there were **decimal places** in the divisor.

Place the decimal point in the quotient over the decimal point in the dividend.

Divide as with whole numbers.

The farmer could fill 35 bottles, or 5 cans.

Copy and divide:

1. $.7\overline{)49}$	6. $.09\overline{)45}$	11. $.2\overline{)18}$	16. $2.5\overline{)30}$
2. $.3\overline{)27}$	7. $.04\overline{)36}$	12. $1.8\overline{)54}$	17. $.25\overline{)30}$
3. $.6\overline{)48}$	8. $.03\overline{)21}$	13. $.16\overline{)80}$	18. $3.2\overline{)16}$
4. $.6\overline{)54}$	9. $.09\overline{)72}$	14. $2.4\overline{)96}$	19. $.28\overline{)14}$
5. $.4\overline{)28}$	10. $.07\overline{)56}$	15. $.12\overline{)72}$	20. $5.5\overline{)22}$

1. Charles has saved \$6 to spend during his vacation. If he spends \$.25 a day, how long will his money last?

2. When oranges cost 2.5 cents apiece, how many can be bought for 75 cents?

DIVIDING A DECIMAL BY A DECIMAL

Mr. Cooper is going to move his house 2.5 miles. How long will it take if it is moved .2 of a mile a day? If it is moved .125 of a mile a day?

How to Divide a Decimal by a Decimal

$.2\overline{)2.5} = 2\overline{)25.}$

$$\begin{array}{r} 12.5 \\ 2\overline{)25.0} \end{array}$$

$.125\overline{)2.5} = 125\overline{)2500.}$

$$\begin{array}{r} 20. \\ 125\overline{)2500.} \\ 250 \\ \hline 00 \end{array}$$

Before dividing, make the divisor a whole number. Move the decimal point in the dividend as many places to the right as there were decimal places in the divisor. Add zeros, if needed.

Place the decimal point in the quotient over the decimal point in the dividend. Then divide.

At .2 of a mile a day it will take 12.5 days.
At .125 of a mile a day it will take 20 days.

1. $.07\overline{)4.90}$	8. $.003\overline{).228}$	15. $.62\overline{)2.046}$
2. $.6\overline{)54.6}$	9. $.9\overline{)7.659}$	16. $.029\overline{)10.44}$
3. $.09\overline{)4.518}$	10. $.4\overline{)45.6}$	17. $6.8\overline{)1.632}$
4. $.04\overline{)26.84}$	11. $.06\overline{)5.886}$	18. $.94\overline{).799}$
5. $.007\overline{)5.817}$	12. $.008\overline{)4.992}$	19. $.019\overline{)1.672}$
6. $.024\overline{)4.8}$	13. $.042\overline{)15.96}$	20. $.56\overline{)25.2}$
7. $.029\overline{)11.02}$	14. $.61\overline{)542.9}$	21. $.028\overline{)15.96}$

USING DECIMALS IN PROBLEMS

1. At \$.75 apiece, how many books can you buy for \$3.00?

2. At 2 for 5 cents, how many pears can you buy for 25 cents? What other way can you work this problem?

3. If a bag of sugar costs \$2.50, how many bags can you buy for \$12.50?

4. At \$.40 a dozen, how many oranges can you buy for \$2.00?

5. At \$.12$\frac{1}{2}$ each, how many melons can you buy for \$1.00?

6. Some Boy Scouts took 18.75 pounds of bacon on a camping trip. If they used 1.25 pounds a day, how long did the bacon last?

7. A man purchased 16.8 tons of coal for the winter. If he used 2.4 tons each month, how long did the coal last?

8. Henry rode his bicycle 20.8 miles in 2.6 hours. Find his average speed per hour.

9. During the summer vacation a boy worked 12.5 days and earned \$31.25. What were his daily wages?

10. The gifts to a Boys' Club in one year averaged \$3.20. The Club collected \$2243.20. How many people gave?

11. A windmill pumped 380.25 gallons of water in 18.5 hours. What was the average amount pumped each hour?

12. There are 365.25 days in a year. Multiply this by your age and find your age in days on your last birthday,

DIVIDING BY NUMBERS ENDING IN ZERO

A farmer delivered 2275 pounds of milk to the dairy. He was to be paid a certain amount per 100 pounds. How many 100 pounds did he deliver?

How to Divide by 10, 100 or 1000

$2275 \div 100 = 22.75$

You have learned that an easy way to multiply by 10, 100 or 1000 is to move the decimal point in the multiplicand one place to the right for each zero in the multiplier. To divide by 10, 100 or 1000, move the decimal point one place to the left for each zero in the divisor.

The farmer delivered 22.75 hundred pounds.

Divide:

1.	$1000 \div 10$	$5000 \div 100$	$2450 \div 1000$	$6234 \div 100$
2.	$1666 \div 10$	$4263 \div 1000$	$7326 \div 100$	$4983 \div 10$
3.	$15.6 \div 100$	$39.41 \div 10$	$43.19 \div 10$	$923.7 \div 100$
4.	$12.47 \div 10$	$768.3 \div 100$	$25.25 \div 100$	$82.64 \div 10$

1. A dealer paid $380 for 100 pairs of shoes. What was the cost of one pair?

2. A football team gained a total of 465 yards in 100 downs. What was the average gain for each down?

3. Bill kept account of how far he drove his car on 10 gallons of gasoline. It was 168.2 miles. What was the average number of miles driven per gallon?

DIVIDING BY NUMBERS ENDING IN ZERO

How many bags holding 200 pounds each would be needed for 6400 pounds of fertilizer?

How to Divide by Whole Numbers Which End in Zero

$6400 \div 200 =$

$$200\!\!\!/\!\!\!/ \overline{)64.00} = 32.$$

Move the decimal point in the dividend one place to the left for each zero in the divisor. Cancel the zeros in the divisor.
Then divide.

32 bags would be needed.

Divide:

1. $10000 \div 200$
2. $18624 \div 300$
3. $175.12 \div 20$
4. $40000 \div 400$
5. $5688 \div 80$
6. $798.55 \div 50$
7. $50000 \div 25000$
8. $7281 \div 900$
9. $2121.7 \div 70$

BUYING BY THE HUNDRED

A dairyman sold 385 pounds of milk at \$2.54 per hundred pounds. How much was he paid for the milk?

$$\begin{array}{r} \$2.54 \\ 3.85 \\ \hline 1270 \\ 2032 \\ 762 \\ \hline \$9.7790 \end{array}$$

\$2.54 is the price of 100 pounds.
385 pounds equal 3 whole hundreds and $\frac{85}{100}$ of another hundred.

This is written 3.85.

Multiply \$2.54, the price of 100 pounds, by 3.85, the number of hundreds.

The dairyman was paid \$9.78 for the milk.

BUYING BY THE THOUSAND

Frank's father bought 6840 feet of lumber at $65 per thousand. How much did the lumber cost?

6.84	$65 is the price of 1000 feet of lumber.
65	6840 feet equal 6 whole thousands and
3420	$\frac{840}{1000}$ of another thousand.
4104	This is written 6.840 or 6.84.
444.60	Multiply in the easier way and call the product dollars and cents.

The lumber cost $444.60.

Divide these numbers by 100; 1000:

9675	423	85672	5467	3000	89
20	5632	19	406	6794	7
125	266	2240	337.5	578.6	934.5
495	130.6	999.9	5600	4381	621.3

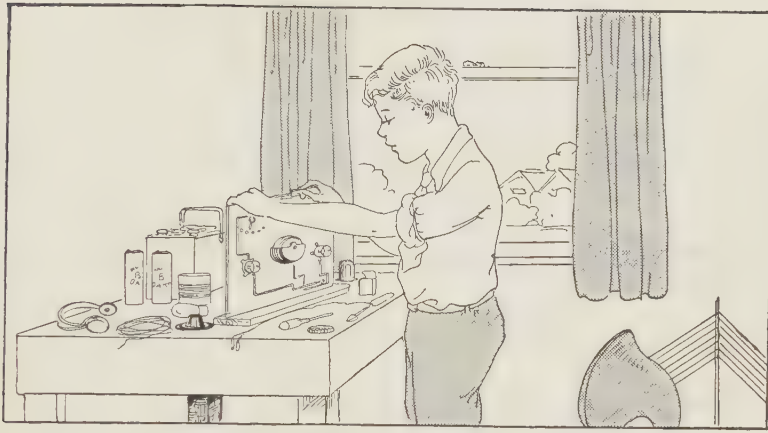
1. Mr. Jones bought 550 pounds of coal at $.78 per hundred pounds. How much did it cost?

2. An ice cream manufacturer bought 1200 pounds of rock salt at 95 cents a hundred pounds. Find the cost.

3. John shipped his canoe and camping outfit. They weighed 235 pounds. At $.87 per hundred find the amount of the freight bill.

4. David collected 266 pounds of old paper and sold it for 27¢ per hundred pounds. How much did he receive?

5. The bricks for the new school cost $22.50 a thousand. What would 22000 bricks cost?



MAKING A RADIO SET

1. Henry Wilson offered to make a cabinet and build a radio set if his father would pay for the parts. His father told Henry that he would buy the parts if the cost was not more than $100. In a catalog Henry found prices of the parts needed and gave his father a list. Find the cost of these different parts and see if Henry kept within the $100: 3 neutroformers for $20.00; 5 sockets at $.50 each; 2 transformers at $4.00 each; 2 condensers at $.75 each; 5 tubes at $2 each; 3 jacks at $1.00; plug, $.50; 2 rheostats at $.75 each; 3 dials at $.25 each; panel, $3.00; storage battery, $12.00; 2 B batteries at $3.00 each; C battery, $.50; wire, $1.00; loud speaker, $8.00; materials for the cabinet, $3.00; 1 battery charger, $10.00.

2. Fred bought a small radio set for $30 and paid $2 for copper wire, $15 for a storage battery and $20 for a loud speaker. How much did all cost?

3. To replace worn-out parts of his radio set, Charles bought 3 tubes at $2.50, a transformer for $4 and a B battery for $4.75. How much did he pay for all?

A TEST IN DECIMALS

Change to fractions or mixed numbers:

.36 4.85 .276 .375 9.025 .96 3.05

Change to decimals or mixed decimals:

$5\frac{4}{5}$ $\frac{7}{8}$ $2\frac{3}{4}$ $\frac{5}{12}$ $31\frac{2}{5}$ $2\frac{5}{8}$

Work:

1. $8.435 + .03 + .8$
2. $16.905 - 3.2$
3. $46.2 + .075 + 3.23$
4. $40.2 - 7.568$
5. $.37 \times .9$
6. $.456 \div 3$
7. $455 \div .07$
8. 4.123×34
9. 40.17×100
10. $568.40 \div 15$
11. $37.23 \div .17$
12. $465.00 + 200$

CHANGING DECIMALS TO FRACTIONS

Change $.33\frac{1}{3}$ to a common fraction.

How to Change a Decimal Ending in a Fraction to a Common Fraction

$.33\frac{1}{3} = 33\frac{1}{3}$ hundredths $= \dfrac{33\frac{1}{3}}{100}$

$33\frac{1}{3} \div 100 = \frac{100}{3} \div 100 = \frac{\cancel{100}}{3} \times \frac{1}{\cancel{100}} = \frac{1}{3} \quad .33\frac{1}{3} = \frac{1}{3}$

Write the decimal as a fraction. Change the numerator to an improper fraction. Divide by the denominator. Reduce to lowest terms.

Change to common fractions:

1. $.66\frac{2}{3}$
2. $.12\frac{1}{2}$
3. $.37\frac{1}{2}$
4. $.62\frac{1}{2}$
5. $.87\frac{1}{2}$
6. $.08\frac{1}{3}$
7. $.06\frac{1}{4}$
8. $.83\frac{1}{3}$
9. $.58\frac{1}{3}$
10. $.18\frac{3}{4}$
11. $.31\frac{1}{4}$
12. $.16\frac{2}{3}$

FRACTIONAL PARTS OF A DOLLAR

The dollar, 100 cents, is the standard unit used in the United States to measure the value of articles bought and sold. There are coins for some of the fractional parts of a dollar that are most commonly used. There are coins for 25 cents or $\frac{1}{4}$ of a dollar, for 50 cents or $\frac{1}{2}$ of a dollar and for 5 cents or $\frac{1}{20}$ of a dollar.

What value is stamped on a 50¢ piece? What value is stamped on a 25¢ piece? Does a dime tell what fractional part of a dollar it is? What part is it? Answer the same questions about a nickel and a cent.

There is no coin for $33\frac{1}{3}$¢ or $\frac{1}{3}$ of a dollar, and none for $37\frac{1}{2}$¢ or $\frac{3}{8}$ of a dollar, nor for several other fractional parts of a dollar which are frequently used in business.

How much will 24 dozen eggs cost at 25¢ a dozen?

$$\begin{array}{r} 24 \\ .25 \\ \hline 6.00 \end{array}$$

$$\overset{6}{\cancel{24}} \times \frac{1}{\cancel{4}} = 6$$

As 25 cents is $\frac{1}{4}$ of a dollar, 24 × \$.25 is the same as 24 × \$$\frac{1}{4}$. Finding $\frac{1}{4}$ of 24 is easier than multiplying 24 by .25 because dividing by 4 is easier than multiplying by .25.

24 dozen eggs will cost \$6.00.

Multiply 16 by .25. Find $\frac{1}{4}$ of 16. Divide 16 by 4.

Multiply 16 by $.12\frac{1}{2}$. Find $\frac{1}{8}$ of 16. Divide 16 by 8.

Multiplying by .25 or dividing by 4 gives the same answer.

Multiplying by $.12\frac{1}{2}$ or dividing by 8 gives the same answer.

Learn to choose the easiest way.

Numbers of cents that are everyday fractions of a dollar are given in this table. Some of these fractional parts you already know. Learn the whole table. It will save you much time.

COMMON FRACTIONAL PARTS OF A DOLLAR

$50¢ = \frac{1}{2}$ of \$1	$16\frac{2}{3}¢ = \frac{1}{6}$ of \$1
$25¢ = \frac{1}{4}$ of \$1	$12\frac{1}{2}¢ = \frac{1}{8}$ of \$1
$75¢ = \frac{3}{4}$ of \$1	$37\frac{1}{2}¢ = \frac{3}{8}$ of \$1
$33\frac{1}{3}¢ = \frac{1}{3}$ of \$1	$62\frac{1}{2}¢ = \frac{5}{8}$ of \$1
$66\frac{2}{3}¢ = \frac{2}{3}$ of \$1	$87\frac{1}{2}¢ = \frac{7}{8}$ of \$1
$20¢ = \frac{1}{5}$ of \$1	$10¢ = \frac{1}{10}$ of \$1
$40¢ = \frac{2}{5}$ of \$1	$8\frac{1}{3}¢ = \frac{1}{12}$ of \$1

Answer quickly:

1.	$16 \times 25¢$	5.	$24 \times 37\frac{1}{2}¢$	9.	$87\frac{1}{2}¢ \times 64$
2.	$16 \times 12\frac{1}{2}¢$	6.	$15 \times 66\frac{2}{3}¢$	10.	$75¢ \times 20$
3.	$12 \times 33\frac{1}{3}¢$	7.	$90 \times 10¢$	11.	$50¢ \times 13$
4.	$36 \times 8\frac{1}{3}¢$	8.	$30 \times 16\frac{2}{3}¢$	12.	$25¢ \times 27$

1. At $33\frac{1}{3}$ cents apiece, how much will 9 books cost?

2. At \$.75 a bushel, how much will 448 bushels of corn cost?

3. When butter is selling at $\$.66\frac{2}{3}$ a pound, how much will 32 pounds cost?

4. At \$.20 a pound, what will be the cost of 180 pounds of raisins?

5. At $\$.87\frac{1}{2}$ apiece, how much will 1008 small bags of flour cost?

ESTIMATING ANSWERS

Which is greater?

1. 10×19 or 20×9
2. 30×15 or 60×7
3. 12×25 or 48×6
4. 20×48 or 10×98
5. 20×12 or 10×25
6. 7×30 or 14×20
7. 8×40 or 16×21
8. $9 \times 25¢$ or $5 \times 40¢$
9. $4 \times \$51$ or $2 \times \$98$
10. $5 \times 49¢$ or $10 \times 28¢$

Which is greater?

1. $70 \div .7$ or $14 \div .2$
2. $3.5 \div 10$ or $70 \div .7$
3. $120 \div 20$ or $200 \div 10$
4. $250 \div 25$ or $250 \div 2.5$
5. $300 \div 3.5$ or $300 \div .35$
6. 9×20 or $.5 \times 40$
7. $70 \times .7$ or $.5 \times 10$
8. 10×3.1 or $10 \times .6$
9. 2.5×10 or $.25 \times 10$
10. 15×20 or 13×4.1

PROBLEMS TO MAKE

Supply the missing numbers and then complete the problems:

1. Three members of a family earn \$——, \$——, \$—— a month. Their living expenses are \$—— a week.

2. Mr. Jones bought a house for \$——, spent \$—— for repairs and sold it for \$——.

Finish these problems:

1. Flour and the barrel weigh 214 pounds. The barrel weighs 18 pounds.

2. A fruit grower shipped 475 barrels of Baldwin apples. The market price was \$3.75 a barrel.

3. A girl buys $3\frac{1}{2}$ yards of muslin to make a dress. Muslin is selling at 36 cents a yard.

MEASURES OF LENGTH

We have learned to measure length by inches, feet and yards. These are called units of measure. There are some longer units called rods and miles.

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
$16\frac{1}{2}$ feet or $5\frac{1}{2}$ yards	= 1 rod (rd.)
320 rods or 5280 feet	= 1 mile (mi.)

36 inches = ? feet	7 rods = ? feet
36 inches = ? yards	$\frac{3}{4}$ yard = ? inches
18 inches = ? yards	7 feet = ? yards
33 feet = ? rods	$\frac{1}{2}$ mile = ? feet

1. What unit of measure should you use in measuring the length and width of your book? Name some other things that you could measure with this unit.

2. Draw a line that you think is one inch long and measure it. Two inches; 4 inches; 6 inches; 10 inches; a foot.

3. What units of measure should you use in measuring your height?

4. What things are usually measured with a yard measure? Draw on the blackboard a line that you think is a yard long. Measure it.

5. Name some objects that you think are 100 yards from your school; 200 yards. Find how nearly right your answers are.

6. With a strong string one rod long, measure the length and the width of the school grounds.

PROBLEMS

1. Find in feet the length of a walk that is 20 rods long.

2. A roll of ribbon is 30 feet long. Change that length to yards.

3. The distance from Tom's home to the railroad station is 1920 rods. Find the distance in miles.

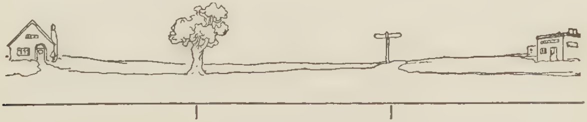
4. In a track meet at Chicago University one of the students made the 100 yard dash in 10 seconds. How many feet did he run each second?

5. The distance from Fred's home to the school is $1\frac{1}{4}$ miles. Find the distance in rods.

SCALE DRAWING

It is very easy to draw a line one inch long on paper or a line one foot, or one yard long on the blackboard. But how could you draw a line a mile long?

Tom lives 3 miles from the center of Lewistown on a straight road. One day he drew a map of the road from his house to the center of Lewistown. Below it he drew a line and marked the distances on it. He let one inch stand for one mile. Here is his map.



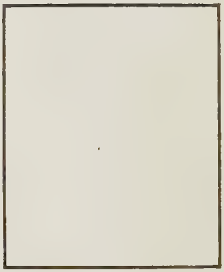
1″ to the mile

How far is it from Tom's house to the post-office? To the tree? From the town line to the post-office? From the tree to the town line?

When we draw short lines to stand for long ones we are *drawing to scale.*

All of the maps in your geography are drawn to scale. Look at some of them and see what scales are used for each.

Scale drawings are used in making plans for houses. Here is a scale drawing of Betty's room. It is 11 feet long and 9 feet wide. The scale is $\frac{1}{8}$ of an inch for one foot.


Betty's Room

The mark ′ stands for foot and ″ stands for inches. 11′ = 11 ft. 8″ = 8 inches.

1. Draw your schoolroom to scale. To do this, what must you know first? Then what must you decide?

2. Ruth has a garden that measures 16′ by 24′. Make a drawing of her garden using the scale 1″ = 8′.

3. John made a scale drawing of his father's farm. He used the scale 1″ = 20 rods. What distance on the drawing would represent 30 rods? 40 rods? 45 rods?

4. Janet made a scale drawing, using as a scale 1″ = 8″. How long a line should she draw to show a distance of 16″? 32″? 24″? 28″? 12″?

5. My father has an automobile road map. The scale shows that 1″ represents 20 miles. How far apart are two towns that are $1\frac{1}{2}$ inches apart on the map? 5 inches?

6. The walk in front of Bob's house is 60 feet long. Make a drawing of it, using the scale 1″ = 12′.

7. Make up problems about drawing to scale for your classmates to work.

MEASURES OF WEIGHT

When you buy from the grocer, the butcher, the iceman and the coalman, you buy by weight. Name some of the things you buy and tell by what unit of weight they are measured.

16 ounces (oz.)	=	1 pound (lb.)
100 pounds	=	1 hundredweight (cwt.)
2000 pounds	=	1 ton (T.)

1. Tell how many pounds there are in:

78 oz. 3 cwt. $2\frac{1}{2}$ T. 96 oz. $2\frac{1}{2}$ cwt.

2. Tell how many ounces there are in:

$\frac{1}{4}$ lb. $\frac{3}{8}$ lb. $\frac{3}{4}$ lb. $1\frac{1}{2}$ lb. 4 lb.

3. If you bought a pound of candy, how many ounces should you receive? If you bought $\frac{1}{2}$ pound?

4. If you bought a quarter of a pound of cookies, how many ounces should you receive? If the cookies were selling at 36 cents a pound, how much should your cookies cost?

5. Tom bought 1 lb. 8 oz. of cheese at 36 cents a pound. How much should he have paid?

6. The grocer had his clerk put 5 pounds of spice into packages containing 2 ounces each. How many packages did he have?

7. When raisin cake is selling at 48 cents a pound, what is a quick way to find the cost of 14 ounces?

8. Each pupil may bring to the class a problem about buying at the store by weight.

DRY MEASURE

THE BOYS' STAND

Charles and Billy raised vegetables and decided to build a stand by the roadside and sell their crops to passers-by. They sold by the pint, quart, peck and bushel.

2 pints (pt.)	=	1 quart (qt.)
8 quarts	=	1 peck (pk.)
4 pecks	=	1 bushel (bu.)
32 quarts	=	1 bushel

1. Charles picked $2\frac{1}{2}$ pecks of peas. He put them in $\frac{1}{2}$ peck bags, which he sold at 25¢ a bag. How much was he paid for the $2\frac{1}{2}$ pecks?

2. Billy picked a bushel of beans, which he sold at 15¢ a quart. How much was he paid for the whole bushel?

3. Charles dug a bushel of potatoes and sold them at the rate of two quarts for 25 cents. How much was he paid for the whole bushel?

4. Billy picked 28 quarts of beans. He put these into $\frac{1}{2}$ peck bags, which he sold at 35 cents a bag. How much was he paid for all of the beans?

5. Charles sold 36 heads of lettuce at 8¢ a head. How much was he paid for all?

6. Billy sold 20 bunches of radishes at the rate of 2 bunches for 15¢. How much was he paid for all?

7. Charles sold $1\frac{1}{2}$ bushels of peas at 60 cents a peck. How much did he receive for all?

8. Billy sold a bushel of peas at 20 cents a quart. How much did he receive for the whole bushel?

9. Charles sold 2 bushels of tomatoes at 40 cents a peck. How much did he receive for all he sold?

Give the missing numbers:

64 quarts = ? bushels	16 quarts = ? pecks
8 pecks = ? bushels	16 quarts = ? bushels
4 pecks = ? quarts	16 quarts = ? pints

BUYING BY THE DOZEN

When you buy from the baker, the eggman, and the fruitman you buy by the dozen. Name some of the things that are sold by the dozen.

12 units	**= 1 dozen (doz.)**
12 dozen	**= 1 gross (gro.)**

1. Mrs. Thomas bought her winter supply of canned vegetables and fruit by the case. There were 2 dozen cans in each case. She bought 2 cases of tomatoes, 1 case of corn, 1 case of cherries and 2 cases of peaches. How many cans had she in all?

2. The school supply store bought a gross of pencils for $4.00, and sold them for 5¢ each. How much was made on the gross?

Give the missing numbers:

480 units = ? dozen	$\frac{3}{4}$ dozen = ? units
$\frac{2}{3}$ dozen = ? units	2 gross = ? units
6 dozen = ? units	3 gross = ? dozen

PROBLEMS

1. If peaches sell at the rate of "2 for 5¢," how much would a dozen cost?

2. If oranges sell at "3 for 5¢," how much would a dozen cost?

3. If oranges sell at "4 for 25¢," how much would a dozen cost?

4. If grapefruit sell at "2 for 25¢," how much would a dozen cost?

5. If grapefruit sell at "3 for 25¢," how much would a dozen cost?

6. If muskmelons sell at "2 for 15¢," how much would a half dozen cost?

7. If muskmelons sell at "4 for 30¢," how much would a dozen cost?

8. If lemons sell at "3 for 10¢," how much would a dozen cost?

9. If eggs sell at 60¢ a dozen, how much would 1 egg cost?

10. If eggs sell at 30¢ a dozen, how much would 4 eggs cost?

11. A dealer bought 12 dozen oranges for $2.88 and sold them at "3 for 10¢." How much did he gain?

LIQUID MEASURE

When you buy from the milkman or from the gasoline station you buy by liquid measure.

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

Name some liquids that are measured by the pint, quart and gallon.

1. Find the cost of 3 gallons of milk at 14¢ a quart.

2. Mrs. Thomas made $4\frac{1}{2}$ gallons of grape juice. She bottled it in pint bottles. How many bottles did she use?

3. A farmer made 256 quarts of maple syrup. How many gallon cans could he fill?

4. An oil barrel holds 42 gallons. How many barrels of oil are there in a tank containing 15,120 gallons?

5. How many gallons are there in eight 40-quart cans of milk?

6. How many $\frac{1}{2}$ pint bottles can be filled from a 40-quart can of milk?

7. The owner of a gasoline station bought a 42-gallon barrel of motor oil for $20, and sold the oil for 20 cents a quart. How much did he gain?

8. The grocer bought New Orleans molasses at 60 cents a gallon and sold it at 35 cents a quart. How much did he gain by selling 20 gallons?

Give the missing numbers:

3 qt. = ? pt.	14 pt. = ? qt.	36 qt. = ? gal.
$2\frac{1}{2}$ gal. = ? qt.	19 pt. = ? qt.	19 qt. = ? pt.

MEASURES OF TIME

When you tell how old you are, how long it takes to run a race or how long you are in school, you use the measures of time.

60 seconds (sec.)	=	1 minute (min.)
60 minutes	=	1 hour (hr.)
24 hours	=	1 day (da.)
7 days	=	1 week (wk.)
365 days	=	1 year (yr.)
366 days	=	1 leap year
52 weeks	=	1 year
12 months	=	1 year

Name the days of the week. How are these names shortened on a calendar?

Name the months of the year. Can you tell how many days there are in each month of the year?

Give the missing numbers:

18 months = ? years	104 weeks = ? years
48 hours = ? days	75 seconds = ? minutes
90 minutes = ? hours	2 years = ? days
15 days = ? hours	42 days = ? weeks
3 years = ? weeks	240 minutes = ? hours

1. Bob started for market at 8:15 A. M. and arrived at 9:30 A. M. How many hours was he on the way? How many minutes?

2. Mary spent $\frac{1}{4}$ of last year with her aunt. How many weeks was she at her aunt's house?

3. When Mary came home from her aunt's, she traveled for 36 hours on the train. How many days was that?

KEEPING A CASH ACCOUNT

Last summer Ted worked as a caddy at a golf course. Here is the account he kept of the money he received and spent during one week.

RECEIVED				SPENT			
Aug 2	caddy fee		75	Aug 2	street car tickets		70
" 3	caddy fee		50	" 2	lunch		25
" 4	caddy fee	1	25	" 3	lunch		20
" 4	tips		25	" 4	lunch		30
" 5	caddy fee	1	00	" 4	movies		15
" 5	tips		25	" 5	lunch		20
" 6	caddy fee		50	" 6	lunch		25
" 7	caddy fee		75	" 7	balance	3	20
		5	25			5	25
" 8	balance	3	20				

At the end of the week, by adding the two sides and subtracting the smaller sum from the larger he finds the *balance.*

This balance shows that Ted earned \$3.20 more than he spent. Ted had \$3.20 to begin his next week's account. On which side did he put it? Copy and fill in his next week's account. Then find the balance.

On August 9, Ted paid 35¢ for one strip of car tickets, 20¢ for his lunch, and earned 75¢ caddying. On Aug. 10, he paid 30¢ for lunch, earned 50¢ and bought a ticket to the ball game for 25¢. On Aug. 11, he bought a pair of wool socks for \$1.50, paid 25¢ for lunch and earned 75¢. On Aug. 12, he earned \$1.25 and paid 30¢ for lunch. On the 13th, he earned 50¢ and paid 35¢ for car tickets and 35¢ for lunch. On the 14th he earned \$1.50 and paid 25¢ for lunch.

MAKING A FAMILY BUDGET

Ruth Brown's father earns \$2520 each year, or \$210 a month. At the beginning of the year he plans how he expects to use his income.

A plan for using an income is called a *budget*.

Ruth's mother showed her the family budget for a month.

Rent	\$ 50.00
Food	60.00
Clothing	28.50
Heat, Light and Supplies	18.00
Other expenses	28.50
Savings	25.00
	\$210.00

1. Find the amount planned for the year for each item.

2. Find the total expenses planned for the year.

3. The cost of food for a child is about 30¢ a day. Ruth has a sister. About how much will the food for the two cost for a 30-day month? For a year?

4. Mr. Brown kept a careful expense account. He found he spent \$264 one year for clothing. His own clothes and his wife's cost \$144. How much did the clothing cost for his two children? How much is that for a month? How much for each child for a month?

5. Make believe that you are given an allowance of \$3.00 a month. Plan a budget for your own use. Allow something for saving, for giving, for play and for real needs.

THRIFT PROBLEMS

1. Mrs. Thompson buys potatoes in small quantities at the rate of 3 pounds for 19¢. If a bushel of potatoes weighs 60 lb., how much could she save by buying a bushel for $1.50?

2. Mrs. Smith found that the butcher charges 50¢ a pound for sliced tongue. He charges only 35¢ a pound for whole tongues. How much could she save by buying a $3\frac{1}{2}$ lb. tongue?

3. If sliced bacon costs 55¢ a pound and whole strips cost 40¢ a pound, how much could be saved by buying a $4\frac{3}{4}$ pound strip?

4. At some seasons of the year men's suits are sold at reduced prices. A suit marked $45 was sold at a bargain sale at $\frac{1}{5}$ off. How much was saved by buying the suit at the sale?

5. Straw hats that sold in May for $4.50 were sold in July at $\frac{1}{3}$ off. How much was saved by buying a hat in July?

6. At a bargain day sale $2 caps were sold at $\frac{1}{4}$ off. At what price were they sold?

7. The candy store is selling 60¢ chocolates at $\frac{1}{3}$ off. At what price are they selling?

8. If a $1.25 book sells at $\frac{1}{5}$ off, how much does it cost?

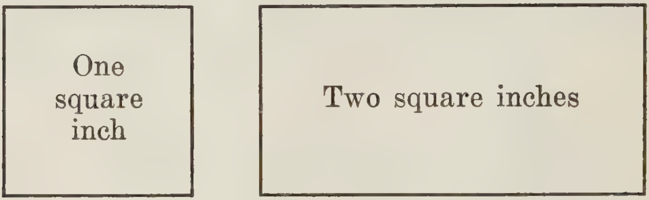
9. On bargain day a dealer sold $30 bicycles at $\frac{1}{4}$ off. At how much apiece did he sell them?

10. Late in the season boys' winter overcoats were sold at $\frac{1}{2}$ off the marked price. Find the cost of a coat marked $25.

SURFACE MEASURES

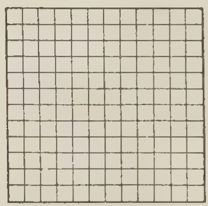
A figure that has four sides and four square corners is called a rectangle. Can you name some rectangles?

A rectangle that has four sides all of the same length is called a square. Name some squares.



A square with each side one inch long is called a square inch. A square with each side one foot long is called a square foot. A square with each side one yard long is called a square yard.

Draw a square foot on the blackboard. Divide it into square inches like this drawing. Count all of the squares. Now count all the square inches across the top and the number of rows of square inches down one side. Multiply the number of square inches in one row by the number of rows.



$$12 \times 12 = 144$$

Is the number the same as when you counted the square inches?

When you find the square inches, square feet or square miles in a rectangle you are finding its *area*. A short way to find the area of a rectangle is to multiply the length by the width. Before multiplying, be sure to have the same units of measure for both length and width.

SURFACE MEASURES

144 square inches (sq. in.)	=	1 square foot (sq. ft.)
9 square feet	=	1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	=	1 square rod (sq. rd.)
160 square rods	=	1 acre (A.)
640 acres	=	1 square mile (sq. mi.)

The distance around a square or rectangle is called its *perimeter.*

1. How many square inches are there in one page of a book that is 6 inches long and 4 inches wide?

2. Measure the top of your desk. How wide is it? How long? What is its perimeter? How many square inches are there on the top of it? The top of your desk is its surface. Name some other surfaces.

3. Find in feet the length and width of your schoolroom floor. What is its perimeter? How many square feet does the floor contain?

4. Measure a rectangular building lot using yards as the unit. How many square yards does it contain?

5. What is the area of a surface one inch square?

6. What is the area in square feet of a surface one foot square? In square inches? What is the perimeter of a surface one foot square?

7. If a rectangle is 10 inches long and 4 inches wide, how many square inches does it contain?

8. If a rectangle is 16 inches long and 6 inches wide, how many square inches does it contain? What is its perimeter?

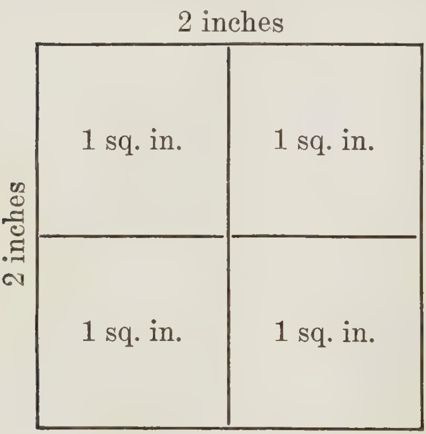
9. If a football field is 100 yards long and $53\frac{1}{3}$ yards wide, how many square yards does it contain?

10. What is the area of a tennis court 78 feet long and 36 feet wide? What is the perimeter?

11. The cover of a box is 18 inches long. Its width is $\frac{2}{3}$ of the length. What is the area of the cover?

12. Find the number of square yards in a building lot 135 ft. long and 50 ft. wide. How many feet of fence are needed to go all around it?

13. A flower garden is 10 feet long and $7\frac{1}{2}$ feet wide. Find the area of the flower garden.



This drawing is a 2 inch square. It contains how many square inches?

Draw a 3 inch square; a 6 inch square.

How many square inches are there in a 3 inch square; in a 6 inch square?

Give the area of the following:

1. A card 8 inches square; 10 inches square.
2. A piece of paper 12 inches long and 6 inches wide.
3. A flower bed 15 feet long and 9 feet wide.
4. A rectangle 20 yards long and 10 yards wide.
5. A floor 30 feet long and 20 feet wide.

TEST IN FRACTIONS

Add:

$9\frac{1}{2}+2\frac{1}{6}+\frac{3}{4}$	$\frac{3}{4}+\frac{3}{8}+\frac{2}{3}$	$8\frac{3}{8}+\frac{3}{16}+2$

Subtract:

$13\frac{5}{8}-8$	$15-\frac{9}{16}$	$11\frac{1}{2}-5\frac{1}{8}$	$17\frac{1}{3}-9\frac{5}{6}$

Multiply:

$8\frac{2}{3}\times\frac{1}{4}$	$15\times\frac{2}{3}$	$28\times 3\frac{3}{5}$	$\frac{3}{16}$ of $\frac{4}{9}$

Divide:

$\frac{3}{5}\div\frac{7}{8}$	$7\frac{1}{4}\div 2\frac{1}{2}$	$\frac{3}{4}\div 3$	$3\frac{1}{3}\div\frac{5}{6}$

TEST IN DENOMINATE NUMBERS

Give the missing numbers:

1.	6 ft. = ? in.	64 bu. = ? qt.	36 hr. = ? da.
2.	? pk. = 3 bu.	? pt. = 8 qt.	8 oz. = ? lb.
3.	5 gal. = ? qt.	1 leap yr. = ? da.	4 sq. rd. = ? sq. yd.
4.	? min. = $1\frac{1}{2}$ hr.	72 units = ? doz.	? ft. = 10 yd.
5.	2 A. = ? sq. rd.	2 sq. mi. = ? A.	2 yr. = ? wk.
6.	4000 lb. = ? T.	2 pk. = ? qt.	6 sq. ft. = ? sq. in.
7.	? gross = 18 doz.	$1\frac{1}{2}$ min. = ? sec.	2 rd. = ? ft.
8.	18 mo. = ? yr.	? sq. ft. = 3 sq. yd.	4 cwt. = ? lb.
9.	28 da. = ? wk.	$\frac{1}{2}$ mi. = ? rd.	730 da. = ? yr.

TEST IN MAKING CHANGE

From $.50 take:	23¢;	38¢;	19¢;	8¢.
From $1.00 take:	49¢;	17¢;	68¢;	72¢.
From $5.00 take:	$4.85;	$3.79;	$2.98;	$1.49.

SELF-RATING PROGRESS TESTS—TEST I

Try this test. Finish all the examples and write the time it took you to work them.

The number of minutes in which more than half your class can finish this test will be the time limit for Tests II, III, IV and V. Work again those examples that are wrong.

1. $$\begin{array}{r} \$213.90 \\ 6.19 \\ 35.71 \\ 220.98 \\ 376.42 \\ 7.88 \\ \hline \end{array}$$

2. $$\begin{array}{r} \$8757.01 \\ -2074.17 \\ \hline \end{array}$$

3. $$\begin{array}{r} \$60.72 \\ \times 90 \\ \hline \end{array}$$

4. $2862 \div 27$

5. 6750×879

6. $$\begin{array}{r} \$1329.51 \\ -924.72 \\ \hline \end{array}$$

7. $$\begin{array}{r} 8074 \\ \times 89 \\ \hline \end{array}$$

8. $2\overline{)\$197.40}$

9. $$\begin{array}{r} \$53.96 \\ \times 79 \\ \hline \end{array}$$

10. $$\begin{array}{r} \$1364.37 \\ -770.50 \\ \hline \end{array}$$

11. $$\begin{array}{r} \$\ 94.34 \\ 8.90 \\ 42.43 \\ 5.66 \\ 37.64 \\ 4.26 \\ \hline \end{array}$$

12. $\$163.02 \div 3$

13. $.3\overline{)2962.8}$

14. What will 3 apples cost when sold at the rate of 4 for 12 cents?

15. A Boy Scout on a hike spent $.85 a day for food. What was his total expense for the trip, if he was away 8 days and had other expenses amounting to $4.05?

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

SELF-RATING PROGRESS TESTS—TEST II

The time limit for this test will be the number of minutes in which more than half your class were able to finish Test I. Try to beat this time.

At the end of the given time, place a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $$\begin{array}{r} \$\ 62.09 \\ 4.79 \\ 920.68 \\ 5.33 \\ 113.26 \\ 51.09 \\ \hline \end{array}$$

2. 98752×609

3. $\$140.32 - \$56.61$

4. $60543 \div 7$

5. $23220 \div 27$

6. $$\begin{array}{r} \$53.96 \\ \times 68 \\ \hline \end{array}$$

7. $$\begin{array}{r} \$146.23 \\ \times 607 \\ \hline \end{array}$$

8. $4\overline{)\$394.84}$

9. If 5 is a factor of 35 what is the other factor?

10. $\frac{3}{4} + \frac{2}{3} =$ $\frac{7}{8} - \frac{1}{4} =$

11. $8\overline{)6064}$

12. John's class had 20 problems to do during the week for home work. John did 4 problems on Monday and 5 problems on Tuesday. What part of his problems had he done?

13. $$\begin{array}{r} \$6843.85 \\ 118.91 \\ 2979.49 \\ 469.48 \\ 4268.89 \\ \hline \end{array}$$

14. $$\begin{array}{r} \$1568.19 \\ -993.31 \\ \hline \end{array}$$

15. $6\overline{)38700}$

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

SELF-RATING PROGRESS TESTS—TEST III

The time limit for this test will be the number of minutes in which more than half your class were able to finish Test I. Try to beat this time.

At the end of the given time, place a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $$\begin{array}{r} \$62.67 \\ 5.57 \\ 89.19 \\ 72.78 \\ 3.67 \\ \underline{65.28} \end{array}$$

2. Subtract $985.43 from $1586.41.

3. Multiply $92.89 by 786.

4. Divide 5480 by 8.

5. Divide 1344 by 28.

6. $$\begin{array}{r} 7538 \\ \underline{\times 57} \end{array}$$

7. Divide $261.68 by 4.

8. $5\overline{)\$487.80}$

9. Multiply 12.09 by 604.

10. How much will one dozen cakes of soap cost at the rate of 3 cakes for 20¢?

11. Find the cost of $4\frac{1}{2}$ pounds of rice at 14¢ a pound.

12. When a crate of eggs holding 30 dozen, sells for $14.40, what is the price per dozen?

13. Divide $\frac{8}{9}$ by $\frac{2}{3}$.

14. Find the difference between $814.50 and $1152.19.

15. Divide 7472 by 8.

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

SELF-RATING PROGRESS TESTS—TEST IV

The time limit for this test will be the number of minutes in which more than half your class were able to finish Test I. Try to beat this time.

At the end of the given time, place a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $\begin{array}{r} 4836 \\ 89992 \\ 5903 \\ 748 \\ 8455 \\ \underline{11509} \end{array}$

2. $\begin{array}{r} \$1569.86 \\ \underline{-649.39} \end{array}$

3. $\begin{array}{r} 20\frac{1}{4} \\ \underline{+3\frac{1}{3}} \end{array}$

4. 2986×97

5. $9\overline{)\$87.84}$

6. $6\overline{)\$405.06}$

7. $\begin{array}{r} \$6787.91 \\ \underline{-3209.24} \end{array}$

8. $\begin{array}{r} \$80.74 \\ \underline{\times 89} \end{array}$

9. $7\overline{)\$514.64}$

10. What will $\frac{3}{4}$ of a dozen eggs cost at 72 cents a dozen? Change $\frac{3}{4}$ to a decimal and check your answer.

11. Write in a column and add: \$9.87, \$.57, \$762.60, \$.35, \$361.75.

12. Find the product of \$12.80 × 4.5. Check your answer by changing 4.5 to a mixed number and working the example again.

13. A man receives a salary of \$2400 a year and spends $\frac{7}{8}$ of it. How much does he save?

14. A man saves $\frac{1}{8}$ of his income of \$2768.72. How much does he save?

15. Find the product of \$26.10 and 852.

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

SELF-RATING PROGRESS TESTS—TEST V

The time limit for this test will be the number of minutes in which more than half your class were able to finish Test I. Try to beat this time.

At the end of the given time, place a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $$\begin{array}{r} \$\ 78.96 \\ 9.87 \\ 354.75 \\ 99.69 \\ 5.78 \\ \underline{834.27} \end{array}$$

2. $$\begin{array}{r} \$12493.24 \\ \underline{-3754.19} \end{array}$$

3. $$\begin{array}{r} 53.74 \\ \underline{\times .95} \end{array}$$

4. $9\overline{)\$768.87}$

5. $81.51 \div .39$

6. Find $\frac{2}{3}$ of 360.

7. Find $\frac{1}{9}$ of \$58.86.

8. A yard of elastic costs 25¢. What will $\frac{4}{5}$ yd. cost?

9. Harry paid the lighting bills for his father. The electric light bill was \$2.06 and the gas bill \$3.58. How much change was due from a ten-dollar bill?

10. Find the product of $6\frac{1}{4} \times 3\frac{3}{5}$.

11. $$\begin{array}{r} \$756.38 \\ \underline{\times 84} \end{array}$$

12. $$\begin{array}{r} \$5765.51 \\ \underline{-1303.72} \end{array}$$

13. $6\overline{)\$589.80}$

14. If you were a clerk, how much change should you return to a customer who gave you a two-dollar bill to pay for $2\frac{1}{2}$ pounds of butter at 54 cents a pound?

15. From $\frac{3}{4}$ of a yard of ribbon, 6 inches is cut off to make a badge. How many inches remain?

Rate yourself—

1 to 9 correct = Poor	**12 or 13 correct = Good**
10 or 11 correct = Fair	**14 or 15 correct = Excellent**

SIXTH GRADE

FIRST HALF

AN APPLE ORCHARD

1. One spring a fruit grower in western New York planted 1000 young trees. There were 50 trees in a row. How many rows did he have?

2. At $40 a hundred what did the 1000 trees cost?

3. The first year the fruit grower spent $300 for spraying the 1000 trees. Find the cost of the spraying per tree.

4. Eight years after the trees were planted the fruit grower picked 1600 bushels of apples and sold them at $1.20 a bushel. What did he receive for the apples?

5. At his roadside stand the fruit grower sold $\frac{1}{2}$ bushel baskets of apples for 75 cents apiece when 3-bushel barrels of apples were selling for $3.50 a barrel. How much more did he receive for a barrel of apples sold by the $\frac{1}{2}$ bushel?

6. A fruit dealer bought a barrel containing 300 apples for $4.25. He sold the apples at 5¢ apiece. What did he make?

ADDITION DRILL

First be sure and then be quick.

1.

7	9	9	9	3	5	5
8	7	8	7	6	6	2
9	8	7	8	8	5	6
6	9	8	7	6	9	9
8	9	9	9	9	8	7

2.

9	7	6	7	3	2	8
7	3	6	9	4	6	1
5	2	4	1	9	8	6
6	8	5	5	5	8	3
7	8	9	8	7	6	7

3.

46	52	62	57	64	20
85	95	11	71	46	23
93	73	70	91	77	98
90	20	11	50	70	74
81	88	18	60	34	48

4.

94	85	65	34	18	99
65	76	67	99	95	69
50	39	82	73	20	78
23	48	88	44	69	86
79	79	29	49	36	46

5. Write in a column and add: $91 + 10 + 87 + 20 + 46$.

The numbers which you add are called *addends*.
The answer in addition is called the *sum* or *amount*.
Finding the sum of two or more numbers is *addition*.
The sign of addition is $+$. It is read *and* or *plus*.

ADDITION DRILL

1.

79	75	68	85	99	24
58	72	46	87	74	53
96	99	88	59	68	93
88	47	89	49	89	36
79	69	45	65	95	83
65	57	97	78	59	99

2.

86	79	637	84	526	889
88	87	369	399	89	47
27	97	79	86	62	685
75	94	398	794	978	45
77	86	779	48	542	412
53	66	59	367	49	56

ADDING DOLLARS AND CENTS

1.

\$6.00	\$78.30	\$410.20	\$815.95
4.15	70.46	504.27	156.82
.10	5.91	885.68	399.64
6.42	.10	241.10	83.07
.93	46.00	850.80	887.99
3.16			36.88

2.

\$794.52	\$2828.30	\$7610.65	\$976.51
927.68	4696.77	6959.38	344.76
59.96	865.95	3652.98	97.38
437.39	8797.88	238.69	269.24
418.98	103.69	54.07	299.13
94.79			753.89

SUBTRACTION DRILL

First be sure and then be quick.

1.

$64.32	$58.00	$14.66	$10.83	$168.43
21.01	10.50	9.46	6.61	95.02

2.

$12.90	$12.40	$11.85	$79.23	$135.38
8.70	7.27	8.27	37.35	94.69

3.

$146.21	$93.64	$821.71	$155.74	$91.71
74.52	13.74	700.59	63.68	45.37

4.

$16.92	$42.36	$52.00	$97.34	$95.32
9.59	13.28	34.88	4.75	91.62

5.

$1467.77	$138.18	$880.00	$1109.56
631.90	57.20	410.32	522.77

6.

$1306.45	$1165.33	$8796.31	$1759.45
830.49	403.48	4142.33	800.57

The number from which we subtract is the *minuend.*

The number that we subtract is the *subtrahend.*

The result in subtraction is the *difference* or *remainder.*

Finding the difference between two numbers is *subtraction.*

The sign of subtraction is —. It is read *minus.*

We check or prove subtraction by adding the *remainder* and the *subtrahend.* If their sum equals the *minuend*, the subtraction is correct.

SUBTRACTION DRILL

Subtract without copying and prove:

1.

11861	11594	15197	16934
4383	6909	7200	7845

2.

13303	99755	98616	15147
3818	32940	13830	8390

3.

11951	14963	13033	17553
6972	5865	8184	9034

4.

13697	13035	15694	11511
4029	7190	7785	3817

SUBTRACTING DOLLARS AND CENTS

Subtract without copying and prove:

1.

$161.81	$1579.41	$151.19	$146.35
83.33	900.84	76.20	56.48

2.

$130.39	$965.53	$556.99	$130.33
91.79	300.34	400.37	71.84

3.

$169.43	$111.53	$879.59	$141.61
68.48	16.75	401.90	83.83

4.

$159.91	$161.47	$151.18	$104.63
90.02	83.90	76.34	14.65

PROBLEMS

Read each problem and before working it, tell what you must do to find the answer.

1. How much change is due from a five-dollar bill given in payment for a hat that costs $2.75 and a pair of gloves that cost $1.69?

2. A teacher started the week with 500 sheets of paper. During the week the A class used 164 sheets and the B class 178 sheets. How many sheets of paper were left at the end of the week?

3. Mildred had saved $3.16 and her mother gave her $3.75 more for helping her. Then she spent $2.45 for a present for her father. How much did she have then?

4. A boy put $2.50 in the bank one week and $1.75 the next. He drew out $1.25. How much was left in the bank?

5. Mrs. Rose paid $4.72 for gas and $2.85 for electricity during the month of January. Her bills for gas and electricity during December were $9.32. How much more were her bills for December than for January?

6. Mrs. Mace had a weekly allowance of $15 for food. During one week she spent $3.15 for vegetables, $4.75 for meat, $1.68 for bread, and $5.30 for groceries. How much did she have left at the end of the week?

7. The school playground is 460 feet long and 388 feet wide. How many feet would a boy walk, if he walked around the edge of the playground?

8. Tom earned money during the vacation by helping his uncle on a farm. He was paid $4.50 for gathering and selling the eggs, $3.10 for working in the garden, $2.75 for delivering milk and $5 for picking cherries. How much less than $20 did he earn?

MULTIPLICATION DRILL

First be sure and then be quick.

Copy and multiply. Check your work by multiplying a second time:

1. 9635 87	2. 4928 67	3. 4087 98	4. 8674 47
5. 8170 43	6. 7685 56	7. 3541 35	8. 2597 62
9. 6314 28	10. 8396 89	11. 5169 74	12. 7321 96
13. 8794 89	14. 6498 56	15. 3029 48	16. 7301 75
17. 5807 96	18. 7065 81	19. 6805 27	20. 6902 39
21. 8092 104	22. 6143 501	23. 578 605	24. 6294 853

The number we multiply is the *multiplicand.*

The number we multiply by is the *multiplier.*

The result in multiplication is the *product.*

These are called the *terms in multiplication.*

Taking one number as many times as there are units in another is *multiplication.*

The sign of multiplication is $\times$. It is read *times* or *multiplied by*. 8 $\times$ 14 bu. is read 8 *times* 14 bu. 14 bu. $\times$ 8 is read 14 bu. *multiplied by* 8.

MULTIPLYING DOLLARS AND CENTS

Copy and multiply:

1. $39.60 79	7. $52.87 32	13. $89.65 54	19. $61.02 35
2. $46.39 203	8. $96.04 98	14. $34.86 47	20. $87.52 809
3. $78.29 56	9. $64.53 61	15. $71.59 37	21. $20.17 46
4. $98.31 89	10. $34.01 205	16. $40.79 68	22. $91.85 508
5. $45.81 709	11. $48.98 67	17. $80.74 89	23. $33.66 78
6. $89.10 41	12. $90.27 107	18. $45.17 74	24. $23.67 906

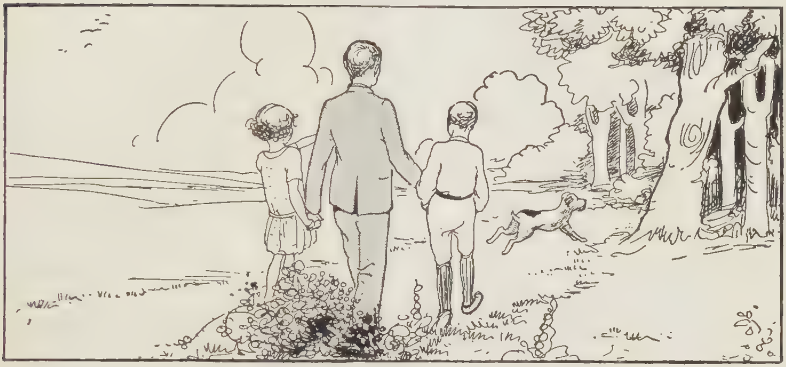
PROBLEMS WITHOUT NUMBERS

1. If you know the number of quarts of milk used by a family each week and also know the price per quart, how can you find the weekly milk bill?

2. If you know the speed of a train and the time that it has run, how can you find the distance that it has traveled?

3. Tell how you would find the average temperature of your schoolroom during a school week.

4. If you know the cost of half a yard of goods, how could you find the cost of a given number of yards?



KEEPING WELL

1. If 20 minutes of each school day are spent in physical exercise, how many hours of school time are given to this part of education in a term of 90 school days?

2. If 84 pupils in a school follow the advice to drink a pint of milk each day, how many quarts of milk will they drink in 5 days?

3. Robert decided it would be better for his health if he walked rather than rode to school. He would also save 16¢ a day. How much would he save in carfare if he walked to school every day for 78 days?

4. "The Boys' Health Club" took a hike each Saturday. One day they hiked to a lake $6\frac{3}{4}$ miles from home. Find the distance to the lake and back home.

5. Four Boy Scouts took a hike to their camp, a distance of $14\frac{1}{2}$ miles. At lunch time they had walked $8\frac{3}{4}$ miles. How far were they from the camp at this time?

6. Some Camp Fire Girls walked $6\frac{3}{4}$ miles in the morning and $4\frac{1}{2}$ miles in the afternoon. How far did they walk that day?

SHORT DIVISION

Divide as quickly as you can:

1.	$\frac{27}{4}$	$\frac{38}{5}$	$\frac{47}{6}$	$\frac{59}{7}$	$\frac{60}{8}$
2.	$\frac{31}{4}$	$\frac{70}{9}$	$\frac{39}{4}$	$\frac{54}{7}$	$\frac{68}{9}$
3.	$7\overline{)58}$	$6\overline{)59}$	$5\overline{)48}$	$9\overline{)85}$	$8\overline{)77}$
4.	$9\overline{)60}$	$8\overline{)53}$	$6\overline{)50}$	$7\overline{)68}$	$8\overline{)63}$
5.	$\frac{1}{2}$ of 12	$\frac{1}{3}$ of 10	$\frac{1}{4}$ of 32	$\frac{1}{5}$ of 40	$\frac{1}{6}$ of 42
6.	$\frac{1}{7}$ of 21	$\frac{1}{8}$ of 17	$\frac{1}{10}$ of 21	$\frac{1}{12}$ of 24	$\frac{1}{16}$ of 48

DIVISION DRILL

First be sure and then be quick.

1.	$2\overline{)8035}$	6.	$5\overline{)1600}$	11.	$6\overline{)6014}$	16.	$7\overline{)1408}$
2.	$8\overline{)6409}$	7.	$9\overline{)2880}$	12.	$2\overline{)47790}$	17.	$3\overline{)2403}$
3.	$3\overline{)7379}$	8.	$4\overline{)1206}$	13.	$5\overline{)7281}$	18.	$9\overline{)7569}$
4.	$4\overline{)26169}$	9.	$6\overline{)3260}$	14.	$7\overline{)4579}$	19.	$8\overline{)2761}$
5.	$3\overline{)2023}$	10.	$6\overline{)4157}$	15.	$9\overline{)7707}$	20.	$7\overline{)4956}$

The number that we divide is the *dividend.*

The number by which we divide is the *divisor.*

The result in division is the *quotient.*

The part of the dividend that is left at the end of division is the *remainder.*

Finding how many times one number is contained in another is *division.* The sign of division is $\div$.

We prove our result in division by multiplying the *divisor* by the *quotient* and adding the *remainder* if any. If the answer equals the *dividend*, the work is correct.

PROBLEMS

1. A school decided to buy a picture and share the expense equally among eight rooms. The picture cost \$36.56. What was each room's share?

2. The cost of a camping trip for 9 boys was \$57.87. What was each boy's share?

3. Eight girls gave a party to their classmates. Each of the 8 girls agreed to pay her share of the cost. They bought 4 quarts of ice cream at 65¢ a quart, and had other expenses amounting to \$1.40. What was each girl's share of the expense?

4. Three boys worked a vegetable garden together. During the summer they sold \$53.76 worth of vegetables. What was each boy's share?

5. During a football game Harry took in \$5.75 from the sale of peanuts at 5¢ a bag. How many bags did he sell?

6. In an example the dividend is 666 and the divisor is 9. What is the quotient?

Copy, work and prove:

1. $4\overline{)\$21.69}$
2. $5\overline{)\$48.83}$
3. $3\overline{)\$14.49}$
4. $9\overline{)\$78.66}$
5. $8\overline{)\$29.25}$
6. $\frac{1}{6}$ of \$32.60
7. $\$358.68 \div 4$
8. $\frac{1}{9}$ of \$86.89
9. $\$52.74 \div 8$
10. $9\overline{)\$34.85}$
11. $\$29.98 \div 8$
12. $\frac{1}{3}$ of \$29.29
13. $\$37.75 \div 7$
14. $\frac{1}{6}$ of \$60.70
15. $\$47.89 \div 6$
16. $3\overline{)\$19.70}$
17. $8\overline{)\$69.95}$
18. $6\overline{)\$59.19}$
19. $2\overline{)\$17.59}$
20. $\frac{1}{5}$ of \$29.89
21. $7\overline{)5481}$

PART TAKING DRILL

Give the fractional parts of the numbers as quickly as you can:

$\frac{1}{2}$ of	8;	12;	16;	20;	18;	28;	24;	22;	14.
$\frac{1}{4}$ of	8;	16;	24;	4;	28;	32;	36;	12;	20.
$\frac{1}{3}$ of	6;	12;	15;	21;	24;	36;	18;	27;	9.
$\frac{1}{8}$ of	16;	32;	48;	40;	56;	72;	64;	24;	8.
$\frac{1}{5}$ of	10;	25;	15;	40;	50;	60;	5;	20;	35.
$\frac{1}{6}$ of	6;	18;	36;	24;	60;	54;	72;	12;	30.
$\frac{1}{7}$ of	14;	28;	49;	56;	70;	63;	35;	21;	42.
$\frac{1}{9}$ of	27;	9;	54;	63;	18;	72;	36;	81;	45.
$\frac{1}{10}$ of	20;	40;	60;	80;	50;	10;	90;	30;	70.

DIVISION DRILL

1.	$7\overline{)2686}$	$6\overline{)5778}$	$3\overline{)2928}$	$4\overline{)2696}$
2.	$9\overline{)7677}$	$8\overline{)6848}$	$6\overline{)3522}$	$4\overline{)8272}$
3.	$3\overline{)2563}$	$5\overline{)3576}$	$9\overline{)6669}$	$3\overline{)9144}$
4.	$2\overline{)1758}$	$8\overline{)7496}$	$7\overline{)2073}$	$9\overline{)8667}$
5.	$4\overline{)3860}$	$5\overline{)3472}$	$7\overline{)5989}$	$6\overline{)4688}$
6.	$9\overline{)8892}$	$8\overline{)7960}$	$3\overline{)2037}$	$7\overline{)2380}$
7.	$4\overline{)\$35.82}$	$5\overline{)\$39.46}$	$8\overline{)\$37.44}$	$7\overline{)\$65.39}$
8.	$6\overline{)\$56.76}$	$9\overline{)\$30.60}$	$7\overline{)\$55.95}$	$8\overline{)\$45.85}$

DIVISIBILITY OF NUMBERS

One number that will contain another number without a remainder is *exactly divisible* by that number. 8 is divisible by 4 because $8 \div 4 = 2$ with no remainder.

2 will exactly divide any even number, that is, any number ending in 0, 2, 4, 6, 8.

5 will exactly divide any number ending in 5 or 0.

10 will exactly divide any number ending in 0.

3 will exactly divide any number the sum of whose digits, or figures, is divisible by 3. 183 is divisible by 3 because $1 + 8 + 3 = 12$. $12 \div 3 = 4$.

6 will exactly divide every even number that 3 will divide. 432 is divisible by 3 because $4 + 3 + 2 = 9$. Since 432 is an even number and is divisible by 3, it is also divisible by 6. $432 \div 6 = 72$.

4 will exactly divide a number if it will divide the number expressed by its last two figures. 124 is divisible by 4 because 24, the number expressed by its last two figures, is divisible by 4. $24 \div 4 = 6$.

8 will exactly divide a number if it will divide the number expressed by its last three figures. 2128 is divisible by 8, because 128, the number expressed by its last three figures, is divisible by 8. $128 \div 8 = 16$.

9 will exactly divide a number if it will divide the sum of its figures. 9 will divide 18 because $1 + 8 = 9$.

Which of these numbers can be exactly divided by 2, 3, 4, 5, 6, 8, 9, 10?

18	114	200	432	600	836
32	115	210	466	423	912
24	125	324	380	711	728

LONG DIVISION DRILL

First be sure and then be quick.

1.	$21\overline{)882}$	2.	$28\overline{)3928}$	3.	$52\overline{)1612}$
4.	$93\overline{)3162}$	5.	$98\overline{)4312}$	6.	$36\overline{)1440}$
7.	$89\overline{)7387}$	8.	$86\overline{)8084}$	9.	$72\overline{)16920}$
10.	$119\overline{)14756}$	11.	$462\overline{)95172}$	12.	$635\overline{)219710}$

Copy, divide and prove:

1.	$97\overline{)8633}$	2.	$46\overline{)4156}$	3.	$82\overline{)6068}$
4.	$87\overline{)83781}$	5.	$53\overline{)43301}$	6.	$62\overline{)5270}$
7.	$94\overline{)67774}$	8.	$76\overline{)6232}$	9.	$80\overline{)63200}$
10.	$59\overline{)4130}$	11.	$95\overline{)6460}$	12.	$84\overline{)7712}$
13.	$93\overline{)80910}$	14.	$602\overline{)46956}$	15.	$75\overline{)73500}$

DIVIDING DOLLARS AND CENTS

1.	$19\overline{)\$59.85}$	2.	$49\overline{)\$32.83}$	3.	$13\overline{)\$20.02}$
4.	$18\overline{)\$49.68}$	5.	$15\overline{)\$13.35}$	6.	$17\overline{)\$34.00}$
7.	$14\overline{)\$71.26}$	8.	$16\overline{)\$31.04}$	9.	$28\overline{)\$180.32}$
10.	$84\overline{)\$16.80}$	11.	$32\overline{)\$12.16}$	12.	$17\overline{)\$69.02}$
13.	$53\overline{)\$15.90}$	14.	$285\overline{)\$188.10}$	15.	$389\overline{)\$268.41}$
16.	$559\overline{)\$346.58}$	17.	$695\overline{)\$479.55}$	18.	$39\overline{)\$272.61}$

SOLVING PROBLEMS

1. David sold 106 papers at 3¢ each and made a profit of $1.59. What did the papers cost him?

I know that 106 papers were sold at 3¢ each. I also know that David made a profit of $1.59. What I wish to find out is the cost of the papers.

I must first find, by multiplying, for how much David sold all the papers.

I must next subtract his profit from what he received.

This will tell me how much David paid for the papers.

Step 1	Step 2
$106 \times .03 = \$3.18$	$\$3.18 - \$1.59 = \$1.59$

The papers cost $1.59.

2. A man earns $145 a month. How much will he save in 8 months, if he spends $575 during that time?

3. Frank received $19.75 for his week's salary. He spent $2.10 for lunches and $9.48 for other expenses. How much had he left?

4. William received $49.80 for vegetables from his garden and $5.20 for berries. If his expenses were $\frac{1}{5}$ of his sales, what was his gain?

5. Mr. Adams picked 1460 pounds of Concord grapes and 1820 pounds of Niagara grapes. He shipped them to market in baskets holding 16 pounds each. How many baskets did he use?

6. Our cooking class made 45 pounds of candy at an average cost of 18¢ a pound. If all the candy was sold at 45¢ a pound, how much did the class make?

7. A peddler bought a bushel of apples for $3.60. At what price must he sell them by the peck in order to gain 15¢ on each peck?

8. An owner of a taxicab agreed to give the driver one-fourth of all his collections as his pay. If the driver carried 96 passengers at 25 cents each, what was his share?

9. When 12 cans of peas cost $1.80, how much must I pay for 8 cans?

10. A stationer bought some books at 87¢ each and sold them at $1.25. How much was made on 50 books?

11. Emma's class used 480 sheets of paper in 3 weeks. At that rate how much paper would the class use in 15 weeks?

12. A man bought an automobile for $775. He paid $175 down and agreed to pay the remainder in 12 monthly payments. How much would he have to pay each month?

13. Fred and his father are both working. Fred earns $1.60 a day and his father earns 6 times as much. How much do both earn each day?

14. When maple syrup sells at $2.80 a gallon, what is the cost of 18 quarts?

15. Jennie's mother bought a hat for $11.49 and 6 pairs of silk stockings at $1.37 a pair. How much did she spend in all?

16. At a school ball game $42.75 was collected for admissions. After taking out $12.75 for expenses, the remainder was divided equally between the two teams. What was each team's share?

READING AND WRITING NUMBERS

I. Read these numbers:

	Area in Sq. Mi.		Area in Sq. Mi.
Alaska	591,000	United States	3,089,000
Siberia	4,832,000	India	1,803,000
Mexico	767,000	British Empire	13,406,000
Canada	3,759,000	Japan	149,000
Brazil	3,291,000	China	3,914,000
Russia	1,330,000	Argentina	1,153,000

II. Write these numbers in figures:

1. Four million, two hundred seventy-six thousand, four hundred nine.

2. Seventy million, six hundred fifty-two thousand.

3. Eight billion, three hundred ninety-nine million, four hundred twenty-three thousand.

III. Write these numbers in Roman numerals:

19	36	49	68	90	100
500	1492	1620	1776	1990	1926

IV. Write in words the numbers in these sentences:

1. The original territory of the United States that was secured by treaty from Great Britain was 892,135 square miles.

2. The United States secured by purchase from France 827,987 square miles. This was known as the Louisiana Purchase.

3. Florida, which was purchased from Spain, contained 71,101 square miles.

PROBLEM STUDY

Read each problem carefully and before working it tell first, *what is given;* second, *what you are to find.* Then *estimate your answer.*

1. At \$29 a suit, how many suits of clothes can a dealer buy for \$1943?

2. The 36 pupils in a fifth grade class had a party that cost \$18.00. How much should each have paid if the expenses were shared equally?

3. When $\frac{1}{2}$ lb. of candy costs 30 cents, how much will a $2\frac{1}{2}$ pound box of candy cost at the same rate?

4. John's mother bought a suit of clothes for \$9.45 and 3 shirts at \$1.35 each. How much did the clothing cost?

5. Use a short method to find the cost of 400 ten-cent toys.

6. Find the cost of 8 yards of ribbon at $12\frac{1}{2}$¢ a yard.

7. When oranges are selling at 2 for 7¢, what will a dozen cost?

8. A farmer's wife received \$4.16 for eggs which she sold at 52¢ a dozen. How many dozen eggs did she sell?

9. Fred bought 6 pencils at the rate of 2 for 5¢ and a note book for 12¢. How much did he spend?

10. Helen bought 16 yards of lace at 35¢ a yard. She gave the clerk a \$10 bill. How much change was due her?

11. Tom has saved \$8.75. His big brother has saved 4 times as much. How much have both saved?

12. Arthur's mother bought an $8\frac{1}{2}$ pound roast of beef at 32¢ a pound. She also paid \$2.68 for vegetables and groceries. How much did she spend in all?

Many sixth grade pupils can do all of these examples within the time limits. How many can you do?

At the end of the given time for each test, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

FOUR MINUTE TEST IN ADDITION WITHOUT COPYING

$6929.65	$3309.86	$3105.10	$8247.18
64.86	42.14	78.94	3113.76
7.89	4700.47	5614.03	5639.41
5587.67	72.50	39.51	3298.20
96.99	854.89	4903.36	2322.55
5.89	5040.78	21.07	4682.19

THREE MINUTE TEST IN SUBTRACTION WITHOUT COPYING

$805.08	$579.30	$758.63	$962.00
723.24	390.80	201.69	622.37
$9418.61	$5159.33	$7975.16	$1558.47
2843.83	4288.35	1046.70	590.50

EIGHT MINUTE TEST IN MULTIPLICATION AFTER COPYING

$79.86	$67.89	$7.48	$548.69	$78.40
82	74	806	57	89
$631.25	$34.98	$209.64	$56.92	$21.30
709	807	39	86	547

TWELVE MINUTE TEST IN DIVISION AFTER COPYING

$17\overline{)71260}$	$24\overline{)50160}$	$53\overline{)15052}$	$47\overline{)15463}$
$48\overline{)22416}$	$98\overline{)33810}$	$84\overline{)17472}$	$119\overline{)3403}$

A PROBLEM TEST

Write the numbers of the problems and the results on your paper. Do not use pencils to work the problems.

1. Find the cost of $9\frac{1}{2}$ yards of baby ribbon at 6¢ a yard.

2. How many inches are there in $1\frac{1}{2}$ yards?

3. How many school days are there in a school term of 15 weeks?

4. Ruth had 75 cents and spent 19 cents for crackers. How much did she have left?

5. How many pint bottles can a milkman fill from a gallon can of milk?

6. How much change should you receive from a dollar given in payment for a pound of steak at 48 cents a pound?

7. How much change should you receive from 75¢ in payment for groceries that cost 48 cents?

8. At 20¢ a pound, how many pounds of grapes can you buy for 50 cents?

9. How many 6-inch pieces of ribbon could you cut from a 4-yard piece?

10. Which is cheaper, 2 pounds of sweet potatoes for 15¢ a pound or 3 pounds for 25¢?

11. How much change was due from a ten-dollar bill given in payment for a pair of shoes costing $5.75?

12. Hats that cost $36 per dozen were sold at $3.75 each. What was the gain on each hat?

13. A boy 50 inches tall is how much over 4 feet tall?

MAKING HOUSEHOLD BUDGETS

Many families find it a good plan to make what is called a budget or plan for using their income wisely. A budget helps one to save. Boys and girls as well as their parents should make budgets for their expenses.

1. Harry's father earns $200 a month. He plans to spend $\frac{1}{5}$ of it for rent, $\frac{1}{4}$ for food, $\frac{1}{10}$ for fuel, $\frac{1}{8}$ for clothing and $\frac{1}{4}$ for other expenses, and to save the rest. Find how many dollars he plans to spend each month for each of these items and how much he plans to save.

2. Grace's mother has an income of $140 a month. She plans to spend $\frac{1}{5}$ of it for rent, $\frac{1}{4}$ for food, $\frac{1}{7}$ for clothing, $\frac{1}{7}$ for other necessary expenses and save the rest. Find how much she plans to spend for each of the items and how much she plans to save.

3. Pretend that you have an allowance of $22 a month and that you have to buy your own shoes, clothing, lunches and pay other expenses. Make up a yearly budget, showing how you could spend the money wisely.

4. Pretend that your mother has gone away for a vacation and left you to manage the household expenses. You have $80 for the month. Make up a budget showing how you might divide the expense.

5. Make a budget showing how much you will allow for each Christmas present you must buy. How much will you need to save each month in the year to have enough money to do your Christmas shopping?

6. Find out from your mother what parts of the yearly income should be set aside for rent, fuel, clothing, food and general expenses. See if you can plan a budget for your own home.

MARKETING

Roast of beef per lb..	32¢	Eggs per doz.........	42¢
Leg of lamb per lb....	42¢	Oranges per doz......	48¢
Chicken per lb......	40¢	Bread	12¢
Sugar per lb.........	$7\frac{1}{2}$¢	Lemons per doz......	36¢
Butter per lb.........	50¢	Flour per bag......	$1.49

Grace did the marketing for her mother. Use this price list to help you find the cost of each day's purchases.

1. Monday: 10 lb. of sugar, 1 doz. eggs. 2 lb. of butter, and a loaf of bread.

2. Tuesday: A roast of beef weighing $5\frac{1}{2}$ lb., a loaf of bread, $\frac{1}{2}$ doz. oranges, a bag of flour.

3. Thursday: A chicken weighing $3\frac{1}{2}$ lb., two doz. eggs, 1 lb. of butter, a loaf of bread, $\frac{1}{4}$ doz. lemons.

4. Saturday: 6 lb. of lamb, 1 doz. oranges, $\frac{1}{2}$ doz. lemons and 2 loaves of bread.

5. Find the price of some of these articles at your own market and bring to class a good problem about buying food.

PROBLEMS WITHOUT NUMBERS

1. If you know how many hours it takes a man to spade your garden and how much he charges an hour, how can you tell what he should be paid?

2. How could you find the price of a certain number of pounds of caramels, if you knew the price of half a pound?

3. Tell how to find the average weight of the pupils in your room, if you know the weight of each.

4. If you know how many gallons of gasoline you used in driving a certain number of miles, how can you tell how many miles you averaged for each gallon?

5. How could you find the number of square feet in the floor of your schoolroom?

6. How could you find the area of a rectangle?

7. Tell how to find the gain when you know the cost and the selling price.

8. A boy's money is all in dimes and nickels. How can you find how much money he has?

9. If you know the width of an American flag, how can you find the width of one stripe?

10. How can you find the fractional part of a day that a boy is in school?

11. Count the number of boys and the number of girls in your class, and find what fractional part of the class are girls. What fractional part are boys?

12. If you know the difference between two numbers and also know one of the numbers, how can you find the other?

INCOMPLETE PROBLEMS

One of the necessary facts in each of these problems is missing. Supply the missing facts and then solve the problems.

1. A teacher bought 8 arithmetics for her class. What was the cost of each?

2. Mary paid 89 cents for a doll's dress. How much money did she have left?

3. John's father gave him $2 to buy sandwiches for a party. How many sandwiches could he buy?

4. Charles bought 5 pounds of sugar at the grocer's. How much change was due him from a dollar bill?

5. At a sale, a woman bought a piece of silk at $1.50 a yard. How much did it cost?

6. William rode his bicycle for 4 hours. What was his average speed per hour?

7. Henry had some rabbits and sold 3 of them. What fractional part of his rabbits did he sell?

8. Tom raised 12 cabbages in his garden and sold them at 5¢ a pound. How much was he paid for them?

9. Helen bought $2\frac{1}{2}$ pounds of lamb chops for dinner. How much did they cost?

10. Robert bought 100 newspapers and sold them at 3¢ apiece. How much did he make?

11. Fred was 7 years old when he entered the first grade. How old is he now?

12. Mrs. Rose bought 4 pounds of beef. How much did it cost?

TESTING OUR PROGRESS

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1\.
```
$ .88
 8.98
 1.09
  .78
 7.89
 4.75
```

2\.
```
 147930
 -50872
```

3\.
```
 $47.80
    ×89
```

4\.
```
$68.05
  7.96
 98.69
   .89
  6.54
```

5\.
```
 165936
 -94237
```

6\.
```
 $69.47
   ×7.8
```

7\. 37)$3218.26

8\. 66)$5785.56

9\.
```
 3715
 ×908
```

10\.
```
$774.97
 458.36
  44.74
 363.96
 677.59
```

11\.
```
 176815
 -90340
```

12\.
```
  289
 ×406
```

13\.
```
$2888.92
  846.96
 9334.34
   29.35
  857.85
   78.49
```

14\.
```
 $9145.15
  -287.19
```

15\.
```
$938.56
  87.73
 698.98
  65.56
 799.79
  54.98
```

Rate yourself—

1 to 9 correct = Poor
10 or 11 correct = Fair
12 or 13 correct = Good
14 or 15 correct = Excellent

TESTING OUR PROGRESS

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1.
$$\begin{array}{r} \$3895.78 \\ 5086.24 \\ 9998.78 \\ 96.69 \\ \underline{2945.64} \end{array}$$

2.
$$\begin{array}{r} 14516 \\ \underline{-5329} \end{array}$$

3. $7\overline{)37709}$

4.
$$\begin{array}{r} \$80.74 \\ \underline{\times 90} \end{array}$$

5. $207\overline{)19665}$

6.
$$\begin{array}{r} \$9886.08 \\ 8479.79 \\ 654.66 \\ 7353.77 \\ \underline{49.36} \end{array}$$

7. Helen's mother bought 85 quarts of berries. She gave 39 quarts to her sister and canned the rest. At 27¢ a quart, find the cost of the berries that she canned.

8. John earned $31.00. How much did he have left after buying a scout suit for $8.75 and a hat for $2.40?

9. At a school Christmas party 32 pounds of candy were given to the kindergarten classes and 43 to the primary classes. At 48¢ a pound, how much did all the candy cost?

10. Each month Mr. Jackson earns $217.50 and pays $70.00 for rent. How much money does he have left?

11. Bob earned $9.50 a week. He spent $1.80 a week for 18 weeks and saved the balance. How much did he save in the 18 weeks?

12. $297\overline{)19602}$

13.
$$\begin{array}{r} 17941 \\ \underline{-9084} \end{array}$$

14.
$$\begin{array}{r} \$90.87 \\ \underline{\times 68} \end{array}$$

15. $4704 \div 48$

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

FRACTIONS

We often divide into equal parts an orange, a dollar, a group of things like a dozen, or a number, like 10.

A single thing, a group of things, a number or anything considered as a whole thing is called a unit.

A *fraction* is the name given to one or more of the equal parts of a unit. $\$\frac{1}{4}$, $\frac{1}{2}$ doz. and $\frac{10}{3}$ are fractions.

The *terms* of a fraction are the *numerator* and the *denominator.*

The *denominator* is the number below the line of a fraction. It shows the number of parts into which the unit has been divided.

The *numerator* is the number above the line of a fraction. It shows the number of parts that have been taken.

Fractions that have the same denominator are called *like fractions.* $\frac{3}{8}$ and $\frac{7}{8}$ are like fractions.

Fractions that have different denominators are called *unlike fractions.* $\frac{3}{4}$ and $\frac{5}{6}$ are unlike fractions.

Division may be expressed in the form of a fraction. The numerator is the dividend and the denominator is the divisor.

$2 \div 3$ may be written $\frac{2}{3}$. $15 \div 9 = \frac{15}{9}$.

A *proper fraction* is a fraction whose numerator is less than the denominator. $\frac{2}{3}$ and $\frac{1}{8}$ are proper fractions.

An *improper fraction* is a fraction whose numerator is as large as or larger than the denominator. $\frac{8}{8}$ and $\frac{7}{4}$ are improper fractions.

A *mixed number* is a whole number and a fraction used together. $2\frac{3}{8}$ is a mixed number.

CHANGING A MIXED NUMBER TO AN IMPROPER FRACTION

How to Change a Mixed Number to an Improper Fraction

$6\frac{7}{8} = \frac{55}{8}$

$5\frac{3}{4} = \frac{23}{4}$

Multiply the whole number by the denominator of the fraction. Add the numerator to the product. Place the result over the denominator.

Change to improper fractions:

1.	$9\frac{2}{3}$	$17\frac{5}{6}$	$11\frac{7}{8}$	$12\frac{7}{9}$	$15\frac{4}{5}$	$8\frac{15}{24}$
2.	$8\frac{7}{8}$	$12\frac{7}{10}$	$14\frac{3}{4}$	$9\frac{1}{5}$	$18\frac{3}{16}$	$11\frac{7}{32}$

CHANGING AN IMPROPER FRACTION TO A WHOLE OR A MIXED NUMBER

How to Change an Improper Fraction to a Whole or a Mixed Number

$\frac{17}{6} = 2\frac{5}{6}$

Divide the numerator by the denominator. If there is a remainder, write it as the numerator of a fraction having the same denominator as the improper fraction.

Change these improper fractions to whole or mixed numbers:

1.	$\frac{32}{3}$	$\frac{27}{8}$	$\frac{96}{10}$	$\frac{56}{4}$	$\frac{48}{5}$	$\frac{63}{6}$	$\frac{29}{16}$
2.	$\frac{64}{12}$	$\frac{44}{5}$	$\frac{31}{6}$	$\frac{51}{8}$	$\frac{75}{10}$	$\frac{39}{3}$	$\frac{59}{12}$
3.	$\frac{21}{5}$	$\frac{60}{9}$	$\frac{28}{3}$	$\frac{35}{16}$	$\frac{25}{24}$	$\frac{25}{20}$	$\frac{66}{32}$
4.	$\frac{38}{3}$	$\frac{41}{4}$	$\frac{52}{5}$	$\frac{40}{15}$	$\frac{36}{10}$	$\frac{40}{32}$	$\frac{43}{20}$

CHANGING A FRACTION TO HIGHER TERMS

In changing a fraction to higher or lower terms we do not change its value.

How to Change a Fraction to Higher Terms

$\frac{4}{5} = \frac{}{20}$	Divide the new denominator by the given denominator.
$20 \div 5 = 4$	
$\frac{4 \times 4}{5 \times 4} = \frac{16}{20}$	Multiply both terms of the fraction by the quotient.

Multiplying both terms of a fraction by the same number does not change the value of the fraction.

Change each of these fractions to 32nds; to 24ths:

$\frac{1}{4}$ $\frac{5}{8}$ $\frac{1}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{3}{8}$ $\frac{7}{8}$

CHANGING A FRACTION TO LOWER TERMS

How to Change a Fraction to Its Lowest Terms

$\frac{18}{24} =$	Divide the numerator and the denominator of the fraction by the largest number that is exactly contained in both.
$\frac{18 \div 6}{24 \div 6} = \frac{3}{4}$	

When $\frac{18}{24}$ has been reduced to $\frac{3}{4}$ it is in its lowest terms because no number except 1 is exactly contained in both 3 and 4.

Dividing both terms of a fraction by the same number does not change the value of the fraction.

Change each of these fractions to its lowest terms:

1. $\frac{3}{6}$ $\frac{2}{6}$ $\frac{4}{8}$ $\frac{3}{9}$ $\frac{4}{10}$ $\frac{2}{12}$ $\frac{7}{14}$ $\frac{12}{16}$
2. $\frac{2}{16}$ $\frac{6}{18}$ $\frac{12}{18}$ $\frac{5}{20}$ $\frac{6}{24}$ $\frac{8}{32}$ $\frac{9}{18}$ $\frac{8}{12}$

DICK'S SPREAD

Dick asked some of his friends to bring some good things to eat for a spread in his barn.

1. Bill's mother gave him a blackberry pie cut into 6ths. The boys cut the pie into 12ths. How many 12ths of a pie could they make from each 6th? How many 12ths were there in the whole pie?

2. Donald brought 2 cakes. They cut them into eighths. How many eighths could they make from two cakes?

3. Dick furnished $2\frac{3}{4}$ pounds of sausages. He planned on $\frac{1}{4}$ pound for each boy. How many quarter pounds are there in $2\frac{3}{4}$ pounds?

4. George went to a bake shop and bought rolls. He planned that each of 11 boys would eat $\frac{1}{4}$ of a dozen. How many dozen rolls were needed?

5. Three of the boys liked marshmallows. Dick bought $\frac{6}{8}$ of a pound. How many fourths of a pound was that?

6. Larry brought 4 melons. They cut each of them into thirds. How many thirds were cut from the 4 melons?

FACTORS AND MULTIPLES

Here is an example in multiplication:

$$3 \times 2 \times 5 \times 6 = 180$$

3, 2, 5 and 6 are all *factors* of 180. The factors of a number are those numbers which multiplied together give that number. Give the factors of 16, 24, 36.

180 is a *multiple* of 3, of 2, of 5, and of 6. A multiple of a number is a number that can be exactly divided by the given number. Give multiples of 5, 8 and 12.

A number which has no factors except itself and 1 is called a *prime number*. 1, 3, 5, 7 and 11 are prime numbers.

A factor that is a prime number is called a *prime factor*.

Which of the factors 3, 2, 5 and 6 are prime factors? Why?

Is 180 the smallest multiple of 3, 2, 5 and 6?

How to Find the Smallest Multiple of Two or More Numbers

See if the largest of the numbers will exactly contain each of the others.

If not, try two times the largest number, then three times the largest number. Keep on multiplying the largest number in this way until you find a multiple of the largest number which will exactly contain each of the given numbers.

The least common denominator of several fractions is the smallest multiple of their denominators.

Find the least common denominator of these groups of fractions:

1. $\frac{1}{12}, \frac{1}{4}, \frac{1}{3}$	3. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$	5. $\frac{1}{4}, \frac{3}{8}, \frac{7}{16}$
2. $\frac{3}{4}, \frac{2}{3}, \frac{1}{2}$	4. $\frac{1}{2}, \frac{1}{5}, \frac{1}{10}$	6. $\frac{2}{3}, \frac{5}{6}, \frac{5}{12}$

ADDING FRACTIONS

Change these fractions to fractions having the least common denominator and add:

1. $\frac{3}{4} + \frac{1}{5}$	8. $\frac{3}{10} + \frac{3}{4} + \frac{1}{2}$	15. $\frac{5}{9} + \frac{1}{6} + \frac{2}{3}$
2. $\frac{1}{4} + \frac{3}{8}$	9. $\frac{2}{5} + \frac{1}{4} + \frac{7}{10}$	16. $\frac{7}{16} + \frac{3}{4} + \frac{5}{8}$
3. $\frac{2}{3} + \frac{3}{4}$	10. $\frac{1}{3} + \frac{1}{2} + \frac{3}{4}$	17. $\frac{3}{8} + \frac{1}{2} + \frac{1}{12}$
4. $\frac{7}{8} + \frac{1}{2}$	11. $\frac{7}{8} + \frac{5}{12} + \frac{1}{2}$	18. $\frac{7}{36} + \frac{7}{9} + \frac{5}{6}$
5. $\frac{2}{3} + \frac{5}{12}$	12. $\frac{5}{6} + \frac{2}{3} + \frac{1}{4}$	19. $\frac{4}{5} + \frac{1}{2} + \frac{3}{10}$
6. $\frac{5}{6} + \frac{1}{4}$	13. $\frac{7}{12} + \frac{1}{8} + \frac{1}{6}$	20. $\frac{3}{20} + \frac{1}{5} + \frac{1}{4}$
7. $\frac{1}{16} + \frac{5}{8}$	14. $\frac{1}{2} + \frac{2}{3} + \frac{5}{9}$	21. $\frac{5}{32} + \frac{7}{16} + \frac{3}{8}$

PROBLEMS

1. A boy spends $\frac{1}{5}$ of his time in school and $\frac{1}{10}$ of his time in studying at home. What part of his time does he spend in these two ways?

2. One day Mary made $\frac{3}{4}$ of a pound of fudge and Ruth made $\frac{3}{8}$ of a pound. How much did both make?

3. Mary spent $\frac{2}{5}$ of a dollar for a ribbon and $\frac{1}{4}$ of a dollar for buttons. What did she spend in all?

4. One third of the trees on our street are maple trees and $\frac{1}{6}$ of them are elm trees. What part of all the trees on the street are maples and elms?

5. Alice spent $\frac{3}{8}$ of her vacation at the seashore and $\frac{1}{2}$ of it at a girls' camp. What part of her whole vacation did she spend at the seashore and at the camp?

6. A planter had 3 small cotton fields. The first produced $\frac{1}{5}$ of a bale, the second $\frac{3}{4}$ of a bale, and the third $\frac{3}{8}$ of a bale. How many bales did he have in all?

ADDING MIXED NUMBERS

John wants to make a shelf to hold 3 sets of books that have been given him. One set is $9\frac{3}{4}$ in. thick, one is $6\frac{7}{8}$ in. thick, and the third is $7\frac{1}{2}$ in. thick. How long a shelf must he make?

How to Add Mixed Numbers

$9\frac{3}{4} + 6\frac{7}{8} + 7\frac{1}{2} =$

$$\begin{aligned} 9\tfrac{3}{4} &= 9\tfrac{6}{8} \\ 6\tfrac{7}{8} &= 6\tfrac{7}{8} \\ 7\tfrac{1}{2} &= \underline{7\tfrac{4}{8}} \\ & 24\tfrac{1}{8} \end{aligned}$$

Change the fractions to fractions having the least common denominator, and add.

If their sum is an improper fraction, change it to a mixed number. Write the fraction and carry the whole number to add to the other whole numbers.

John's shelf must be $24\frac{1}{8}$ inches long.

Add:

1. $7\frac{1}{4} + 1\frac{1}{2} + 3\frac{2}{3}$
2. $\frac{3}{10} + \frac{3}{4} + \frac{1}{2}$
3. $\frac{2}{5} + \frac{1}{4} + \frac{7}{10}$
4. $5\frac{5}{12} + 8\frac{1}{6} + 4\frac{1}{3}$
5. $16\frac{1}{9} + 5\frac{5}{6} + 9\frac{2}{3}$
6. $\frac{3}{20} + 2\frac{1}{5} + \frac{1}{4}$
7. $6\frac{3}{4} + 2\frac{1}{8} + 10\frac{1}{4}$
8. $16\frac{3}{4} + 7\frac{2}{3} + 5\frac{1}{8}$
9. $11\frac{1}{2} + 10\frac{3}{8} + \frac{3}{4}$
10. $12 + 6\frac{3}{4} + 2\frac{2}{3}$

1. James sent 3 packages by parcel post, weighing $2\frac{1}{2}$ lb., $3\frac{3}{4}$ lb. and $1\frac{7}{8}$ lb. What did all three weigh?

2. Harry is a Boy Scout. In buying supplies for a trip, he bought $2\frac{1}{2}$ pounds of bacon, and $6\frac{3}{4}$ pounds of sugar to add to his supplies, which already weighed 15 pounds. What was the total weight?

3. Betty rode her wheel $3\frac{1}{3}$ miles in the morning. In the afternoon she rode to Nan's and back home. If Nan lived $2\frac{3}{4}$ miles away, how far did Betty ride in all?

SUBTRACTING FRACTIONS

Subtract:

1. $\frac{3}{4} - \frac{1}{8}$	8. $\frac{5}{8} - \frac{1}{2}$	15. $\frac{2}{3} - \frac{1}{2}$	22. $\frac{1}{4} - \frac{1}{12}$
2. $\frac{1}{3} - \frac{1}{6}$	9. $\frac{1}{2} - \frac{1}{3}$	16. $\frac{3}{8} - \frac{1}{4}$	23. $\frac{1}{2} - \frac{3}{10}$
3. $\frac{1}{2} - \frac{1}{5}$	10. $\frac{1}{3} - \frac{1}{9}$	17. $\frac{3}{4} - \frac{3}{8}$	24. $\frac{3}{4} - \frac{7}{12}$
4. $\frac{2}{3} - \frac{1}{4}$	11. $\frac{1}{2} - \frac{2}{9}$	18. $\frac{7}{24} - \frac{1}{6}$	25. $\frac{3}{16} - \frac{1}{8}$
5. $\frac{7}{8} - \frac{3}{4}$	12. $\frac{7}{10} - \frac{3}{5}$	19. $\frac{3}{4} - \frac{5}{10}$	26. $\frac{5}{18} - \frac{2}{9}$
6. $\frac{5}{9} - \frac{3}{6}$	13. $\frac{3}{4} - \frac{5}{16}$	20. $\frac{3}{4} - \frac{2}{3}$	27. $\frac{9}{10} - \frac{2}{5}$
7. $\frac{4}{5} - \frac{2}{3}$	14. $\frac{3}{8} - \frac{1}{12}$	21. $\frac{7}{16} - \frac{3}{8}$	28. $\frac{9}{14} - \frac{3}{7}$

PROBLEMS

1. Frank's kite string is $\frac{1}{12}$ of a mile long and Tom's kite string is $\frac{1}{8}$ of a mile long. Which string is the longer? How much longer?

2. Mary asked the butcher to give her $\frac{1}{2}$ of a pound of steak. He cut a piece that weighed $\frac{5}{8}$ of a pound. How much too heavy was it?

3. Charles had $\frac{3}{4}$ of a dollar when he went to the circus. When he returned home, he had only $\frac{1}{10}$ of a dollar. How much had he spent?

4. It is $\frac{1}{2}$ of a mile from my home to the school and $\frac{1}{3}$ of a mile from my home to the store. How much nearer is the store?

5. John tends the furnace. Last week he had $\frac{7}{8}$ of a ton of coal. Now he has only $\frac{1}{2}$ of a ton. How much coal has he used?

6. I will give you $\frac{3}{4}$ of a pound of candy. If you give $\frac{1}{3}$ of a pound to Billy, how much will you have left?

HOW TO SUBTRACT MIXED NUMBERS

With his overcoat on, Bob weighs 98 lb. If his overcoat weighs $6\frac{7}{8}$ lb., how much does he weigh without it?

$$98 - 6\tfrac{7}{8} =$$

$$\begin{aligned} 98 &= 97\tfrac{8}{8} \\ 6\tfrac{7}{8} &= \underline{\;6\tfrac{7}{8}\;} \\ & \quad 91\tfrac{1}{8} \end{aligned}$$

Change 98 to $97\frac{8}{8}$ before you subtract. Subtract the fractions first and then the whole numbers.

Bob weighs $91\frac{1}{8}$ lb. without his overcoat.

Copy and subtract:

1. $16 - 4\frac{2}{3}$
2. $8 - 5\frac{1}{4}$
3. $15 - 6\frac{5}{8}$
4. $24 - 11\frac{4}{5}$
5. $9 - 7\frac{3}{10}$
6. $20 - 8\frac{5}{6}$

Mrs. Rogers bought $6\frac{1}{2}$ bushels of apples. When she had used $3\frac{3}{4}$ bushels, how many bushels were left?

$$6\tfrac{1}{2} - 3\tfrac{3}{4} =$$

$$\begin{aligned} 6\tfrac{1}{2} &= 6\tfrac{2}{4} = 5\tfrac{6}{4} \\ 3\tfrac{3}{4} &= 3\tfrac{3}{4} = \underline{3\tfrac{3}{4}} \\ & \qquad\quad\; 2\tfrac{3}{4} \end{aligned}$$

$\frac{2}{4}$ is less than $\frac{3}{4}$. Change $6\frac{2}{4}$ to $5\frac{6}{4}$ before you subtract. Why?

Mrs. Rogers had $2\frac{3}{4}$ bushels left.

Copy and subtract:

1. $7\frac{1}{2} - 3\frac{7}{8}$
2. $9\frac{1}{4} - 2\frac{5}{8}$
3. $9\frac{2}{3} - 2\frac{3}{4}$
4. $27\frac{3}{8} - 18\frac{5}{6}$
5. $200\frac{2}{9} - 23\frac{1}{2}$
6. $86\frac{5}{12} - 37\frac{7}{8}$
7. $54\frac{1}{6} - 17\frac{3}{4}$
8. $103\frac{1}{4} - 13\frac{4}{5}$
9. $100 - 3\frac{5}{12}$
10. $27\frac{5}{6} - 9$
11. $73\frac{5}{7} - 36\frac{2}{3}$
12. $95\frac{1}{9} - 76\frac{7}{12}$
13. $341\frac{1}{2} - 281\frac{4}{5}$
14. $101\frac{2}{5} - 38\frac{3}{4}$
15. $72\frac{3}{10} - 44\frac{4}{5}$
16. $65\frac{4}{15} - 27\frac{2}{3}$
17. $28\frac{2}{5} - 12\frac{3}{4}$
18. $37\frac{1}{4} - 18\frac{2}{5}$
19. $222\frac{5}{9} - 134\frac{3}{4}$
20. $124\frac{7}{12} - 119$
21. $9\frac{7}{10} - 8\frac{3}{4}$

THE HOBBY FAIR

The pupils of Roosevelt School had a hobby fair in the gymnasium. Those who had made interesting things brought them for other pupils to see.

1. Richard showed the doll's house he built for his sister. It was $2\frac{5}{6}$ feet long and $1\frac{3}{4}$ feet wide. Which was greater, the length or the width? How much?

2. Polly exhibited some paper flowers. She made them from $\frac{5}{6}$ of a yard of pink paper, $\frac{1}{4}$ of a yard of yellow and $\frac{1}{3}$ of a yard of green. How much paper did she use?

3. Virginia showed a book of snapshots that she took in the mountains. Her camera takes a picture $4\frac{1}{4}$ inches long and $2\frac{1}{2}$ inches wide. How much longer are the pictures than they are wide?

4. Gertrude showed the funny little figures she models from clay. She used $1\frac{1}{4}$ pounds of red clay, $\frac{3}{8}$ of a pound of green, $\frac{5}{8}$ of a pound of brown and $\frac{3}{16}$ of a pound of blue. How many pounds did she use in all?

5. Tom showed a bird house that he made. The other boys wanted to know how much wood to buy to build one like it. Tom said he bought a board 4 inches wide and cut the floor piece $3\frac{3}{4}$ inches long; 2 sides, each $3\frac{1}{8}$ inches long; front and back each $5\frac{1}{4}$ inches long; and 2 roof pieces each $4\frac{1}{2}$ inches long. Allowing 2 inches for waste, how long was the board he bought?

MULTIPLYING WHOLE NUMBERS AND FRACTIONS

Grace wants to buy a piece of linen long enough to make 4 towels each $\frac{5}{8}$ of a yard long. How many yards does she need?

How to Multiply a Fraction by a Whole Number

$\frac{5}{8} \times 4 =$

One Way

$\frac{5}{8} \times 4 = \frac{20}{8} = 2\frac{1}{2}$

Multiply the numerator of the fraction by the whole number and write the product over the denominator. Then reduce the fraction to a mixed number.

Another Way

$\frac{5}{8} \times 4 = \frac{5}{8 \div 4} = \frac{5}{2} = 2\frac{1}{2}$

Instead of multiplying the numerator, if the denominator contains the whole number an exact number of times you may divide the denominator by the whole number. The answer is the same in either case.

Grace needs $2\frac{1}{2}$ yards.

Multiplying the numerator of a fraction by a whole number multiplies the fraction.

Dividing the denominator of a fraction by a whole number multiplies the fraction.

Work each of these examples twice. The first time multiply the numerators by the whole numbers. The second time divide the denominators by the whole numbers:

1. $2 \times \frac{1}{4}$	7. $4 \times \frac{7}{8}$	13. $\frac{9}{10} \times 5$	19. $\frac{5}{24} \times 12$
2. $5 \times \frac{2}{5}$	8. $\frac{4}{9} \times 3$	14. $8 \times \frac{7}{16}$	20. $8 \times \frac{9}{24}$
3. $3 \times \frac{5}{12}$	9. $6 \times \frac{15}{24}$	15. $\frac{5}{6} \times 3$	21. $\frac{7}{18} \times 6$
4. $2 \times \frac{5}{8}$	10. $\frac{3}{4} \times 4$	16. $10 \times \frac{9}{20}$	22. $\frac{7}{8} \times 8$
5. $5 \times \frac{3}{10}$	11. $\frac{3}{8} \times 2$	17. $\frac{5}{18} \times 9$	23. $5 \times \frac{7}{10}$
6. $6 \times \frac{7}{12}$	12. $\frac{4}{5} \times 5$	18. $\frac{3}{25} \times 5$	24. $\frac{9}{16} \times 4$

USING CANCELLATION IN MULTIPLICATION

There are 36 pupils in our class. $\frac{5}{9}$ of them are girls. How many girls are there?

$\frac{5}{9}$ of $36 =$

$$\frac{5}{\cancel{9}} \times \overset{4}{\cancel{36}} = 20$$

When multiplying a fraction by a whole number or a whole number by a fraction, the work is easier if we can divide the whole number by the denominator or the denominator by the whole number. This is canceling.

There are 20 girls in our class.

Find:

1.	$\frac{1}{4} \times 16$	**5.**	$\frac{3}{4} \times 16$	**9.**	$\frac{5}{8} \times 16$	**13.**	$\frac{7}{16} \times 4$
2.	$\frac{1}{3} \times 24$	**6.**	$\frac{2}{3} \times 24$	**10.**	$\frac{5}{8} \times 24$	**14.**	$\frac{5}{6} \times 24$
3.	$\frac{1}{10} \times 50$	**7.**	$\frac{7}{10} \times 5$	**11.**	$\frac{9}{10} \times 40$	**15.**	$\frac{3}{10} \times 20$
4.	$\frac{7}{8} \times 32$	**8.**	$\frac{5}{12} \times 96$	**12.**	$\frac{7}{8} \times 256$	**16.**	$\frac{4}{3} \times 720$

1. In the Oak Street School there are 450 pupils registered. One day $\frac{1}{3}$ of them were absent because of measles. How many were absent? How many were present?

2. In a spelling examination, 60 words were pronounced. Archie spelled $\frac{11}{12}$ of them correctly. How many did he spell correctly? How many did he misspell?

3. A man whose salary is \$160 a month pays $\frac{1}{4}$ of it for rent and $\frac{2}{5}$ of it for food and clothes. How much does he pay for rent? How much for food and clothes?

4. A cotton planter who had 24000 pounds of cotton one year, picked $\frac{1}{4}$ of it during the first picking. How many pounds did he have at the end of the first picking?

MULTIPLYING A FRACTION BY A FRACTION

Frank bought $\frac{3}{4}$ of a pound of maple sugar and gave his sister $\frac{2}{3}$ of it. What part of a pound did he give to his sister?

How to Multiply a Fraction by a Fraction

$\frac{2}{3}$ of $\frac{3}{4} =$ $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$	Multiply the numerators together for a new numerator and the denominators together for a new denominator.
$\frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{3}}{\underset{2}{\cancel{4}}} = \frac{1}{2}$	The work may be made easier by canceling.

Frank gave his sister $\frac{1}{2}$ of a pound.

Multiply, using cancellation whenever possible.

1. $\frac{3}{10} \times \frac{5}{6}$	9. $\frac{5}{8} \times \frac{2}{9}$	17. $\frac{3}{16} \times \frac{8}{9}$
2. $\frac{4}{5} \times \frac{3}{8}$	10. $\frac{7}{16} \times \frac{8}{9}$	18. $\frac{3}{5} \times \frac{4}{9}$
3. $\frac{3}{12} \times \frac{4}{9}$	11. $\frac{4}{15} \times \frac{5}{8}$	19. $\frac{3}{5} \times \frac{11}{12}$
4. $\frac{5}{6} \times \frac{4}{15}$	12. $\frac{2}{5} \times \frac{5}{9}$	20. $\frac{3}{8} \times \frac{3}{5}$
5. $\frac{2}{3} \times \frac{4}{5}$	13. $\frac{7}{16} \times \frac{4}{5}$	21. $\frac{2}{3} \times \frac{7}{12}$
6. $\frac{1}{2} \times \frac{7}{8}$	14. $\frac{9}{10} \times \frac{2}{3}$	22. $\frac{3}{4} \times \frac{2}{15}$
7. $\frac{3}{5} \times \frac{5}{9}$	15. $\frac{4}{5} \times \frac{5}{6}$	23. $\frac{9}{10} \times \frac{4}{5}$
8. $\frac{1}{6} \times \frac{4}{5}$	16. $\frac{2}{3} \times \frac{3}{8}$	24. $\frac{3}{20} \times \frac{5}{12}$

1. Mrs. Brown bought $\frac{1}{2}$ of a box of oranges and used $\frac{4}{5}$ of them. What part of a box did she use?

2. A dealer who had $\frac{5}{12}$ of a gross of pencils, sold $\frac{3}{5}$ of them. What part of a gross did he sell?

MULTIPLYING FRACTIONS AND MIXED NUMBERS

Mother bought three pieces of cloth at a remnant sale. The first piece was $4\frac{1}{2}$ yards long. The second piece was $\frac{2}{3}$ as long as the first piece. The third piece was $2\frac{1}{3}$ times the length of the first piece. How long was the second piece? The third?

How to Multiply Fractions and Mixed Numbers	
1. $4\frac{1}{2} \times \frac{2}{3} =$ $4\frac{1}{2} = \frac{9}{2}$ $\quad \frac{\overset{3}{\cancel{9}}}{\cancel{2}} \times \frac{\cancel{2}}{\cancel{3}} = 3$	Change the mixed numbers to improper fractions. Cancel if possible. Multiply.
2. $4\frac{1}{2} \times 2\frac{1}{3} =$ $4\frac{1}{2} = \frac{9}{2} \quad 2\frac{1}{3} = \frac{7}{3}$ $\frac{\overset{3}{\cancel{9}}}{2} \times \frac{7}{\cancel{3}} = \frac{21}{2} = 10\frac{1}{2}$	The second piece was 3 yards long. The third piece was $10\frac{1}{2}$ yards long.

Copy and multiply:

1.	$\frac{3}{4} \times 5\frac{1}{3}$	7.	$\frac{2}{3} \times 6\frac{3}{8}$	13.	$\frac{2}{3} \times 11\frac{2}{5}$
2.	$\frac{2}{3} \times 2\frac{1}{4}$	8.	$\frac{8}{9} \times 8\frac{1}{4}$	14.	$\frac{3}{5} \times 16\frac{1}{2}$
3.	$\frac{1}{3} \times 7\frac{1}{2}$	9.	$\frac{4}{5} \times 9\frac{2}{3}$	15.	$\frac{1}{2} \times 9\frac{1}{7}$
4.	$\frac{5}{8} \times 9\frac{3}{4}$	10.	$\frac{3}{5} \times 4\frac{3}{8}$	16.	$\frac{3}{4} \times 14\frac{1}{8}$
5.	$3\frac{1}{3} \times 1\frac{4}{5}$	11.	$4\frac{4}{9} \times 3\frac{3}{4}$	17.	$3\frac{2}{3} \times 5\frac{1}{4}$
6.	$7\frac{1}{2} \times 2\frac{2}{3}$	12.	$7\frac{1}{5} \times 6\frac{1}{4}$	18.	$6\frac{2}{5} \times 2\frac{1}{12}$

1. If a recipe called for $1\frac{3}{4}$ cups of milk and you were making $\frac{1}{2}$ of the recipe, how much milk would you use?

2. Helen's father is $5\frac{5}{6}$ feet tall. Helen is just $\frac{2}{3}$ as tall as her father. How tall is she?

3. What is $\frac{4}{5}$ of $6\frac{1}{2}$ bushels of potatoes?

MULTIPLYING A WHOLE NUMBER BY A MIXED NUMBER

How far can you go in $12\frac{3}{4}$ hours if you travel 27 miles an hour?

How to Multiply a Whole Number by a Mixed Number

$27 \times 12\frac{3}{4} =$

$$\begin{array}{r} 27 \\ \underline{12\frac{3}{4}} \\ 4)\overline{81} \\ 20\frac{1}{4} \\ 54 \\ \underline{27} \\ 344\frac{1}{4} \end{array}$$

Multiply the whole number by the numerator of the fraction.
Divide the product by the denominator of the fraction.
Then multiply the whole number by the whole number of the multiplier. Add.

You can go $344\frac{1}{4}$ miles.

Copy and multiply:

1. $13 \times 4\frac{3}{4}$	6. $22 \times 14\frac{5}{8}$	11. $58 \times 37\frac{8}{9}$
2. $32 \times 5\frac{1}{2}$	7. $24 \times 21\frac{3}{4}$	12. $84 \times 16\frac{5}{8}$
3. $24 \times 8\frac{3}{8}$	8. $30 \times 16\frac{1}{8}$	13. $527 \times 29\frac{1}{3}$
4. $25 \times 6\frac{2}{5}$	9. $16 \times 15\frac{7}{8}$	14. $430 \times 58\frac{3}{10}$
5. $31 \times 9\frac{5}{6}$	10. $12 \times 11\frac{1}{6}$	15. $620 \times 75\frac{4}{5}$

1. Mr. Brown shipped 200 gallon cans of maple syrup that weighed $11\frac{3}{4}$ pounds apiece. Find the weight of the 200 gallons.

2. Mary's father earned \$36 a week for $16\frac{1}{2}$ weeks. How much did he earn?

3. There are 20 school days in a month. How many school days are there in $9\frac{3}{4}$ months?

4. Mark keeps hens. Yesterday he sold $3\frac{2}{3}$ dozen eggs at 34 cents a dozen. How much did he receive for them?

DIVIDING A WHOLE NUMBER BY A FRACTION

Mrs. Rose served 4 grapefruit for breakfast. She gave $\frac{1}{2}$ of a grapefruit to each person. How many people did she serve?

There are 2 halves in 1 grapefruit, 4 halves in 2 grapefruit, and 8 halves in 4 grapefruit.

There are twice as many half grapefruit as there are whole grapefruit.

Dividing by $\frac{1}{2}$ is the same as multiplying by $\frac{2}{1}$. Changing the fraction $\frac{1}{2}$ to $\frac{2}{1}$ is called inverting the fraction.

How to Divide a Whole Number by a Fraction

$4 \div \frac{1}{2} = 4 \times \frac{2}{1} = 8$	Invert the divisor and multiply. Mrs. Rose served 8 people.

Invert the divisors and multiply:

1. $14 \div \frac{2}{3}$	5. $12 \div \frac{1}{8}$	9. $9 \div \frac{1}{10}$
2. $16 \div \frac{4}{5}$	6. $18 \div \frac{3}{5}$	10. $27 \div \frac{9}{25}$
3. $21 \div \frac{3}{4}$	7. $28 \div \frac{7}{8}$	11. $14 \div \frac{4}{5}$
4. $10 \div \frac{2}{5}$	8. $32 \div \frac{4}{5}$	12. $20 \div \frac{5}{6}$

1. How long will 10 pounds of bacon last our family if we use $\frac{2}{3}$ of a pound a day?

2. At a maple sugar grove $\frac{1}{5}$ of a gallon of syrup is poured into each bottle. How many bottles will be needed for 220 gallons?

3. If Fred earns $\frac{3}{4}$ of a dollar a day by doing errands, how long will it take him to earn \$30.00?

4. If one ice cream cone is filled with $\frac{1}{8}$ of a quart of cream, how many cones will 16 quarts fill?

DIVIDING A FRACTION BY A FRACTION

How many miles can Frank run his father's launch in $\frac{3}{4}$ of an hour, if he can go a mile in $\frac{1}{6}$ of an hour?

How to Divide a Fraction by a Fraction

$\frac{3}{4} \div \frac{1}{6} = \frac{3}{\cancel{4}_2} \times \frac{\cancel{6}^3}{1} = \frac{9}{2} = 4\frac{1}{2}$ Invert the divisor. Cancel and multiply.

Frank can run the launch $4\frac{1}{2}$ miles in $\frac{3}{4}$ of an hour.

Copy and divide. Change all mixed numbers to improper fractions before you divide:

1. $\frac{3}{4} \div \frac{1}{2}$	7. $\frac{2}{5} \div \frac{1}{3}$	13. $\frac{5}{6} \div 2\frac{2}{3}$
2. $\frac{4}{9} \div \frac{2}{3}$	8. $\frac{9}{10} \div \frac{3}{5}$	14. $6\frac{3}{8} \div \frac{3}{4}$
3. $\frac{4}{5} \div \frac{1}{10}$	9. $\frac{4}{5} \div \frac{3}{8}$	15. $5\frac{5}{8} \div 3\frac{3}{4}$
4. $\frac{2}{9} \div \frac{1}{6}$	10. $\frac{7}{12} \div \frac{5}{8}$	16. $4\frac{1}{5} \div 3\frac{1}{2}$
5. $\frac{5}{8} \div \frac{3}{4}$	11. $\frac{1}{2} \div \frac{1}{12}$	17. $\frac{5}{10} \div 4\frac{1}{6}$
6. $\frac{3}{10} \div \frac{9}{8}$	12. $\frac{3}{4} \div \frac{9}{10}$	18. $9\frac{1}{6} \div \frac{5}{8}$

1. Mary had $2\frac{1}{2}$ pounds of candy for her birthday. To how many of her friends could she give $\frac{1}{8}$ of a pound?

2. Frank had $6\frac{3}{4}$ bushels of peas to sell. If he sold $\frac{1}{4}$ of a bushel to each of his customers, how many customers could he supply?

3. In the fall, we had $10\frac{2}{5}$ tons of coal. If we used $1\frac{1}{5}$ tons a month, how long did the supply last?

4. A farmer bought $3\frac{3}{10}$ tons of fertilizer. How many acres did he fertilize if he used $\frac{3}{5}$ of a ton to an acre?

DIVIDING A FRACTION BY A WHOLE NUMBER

William had $\frac{2}{3}$ of a melon and cut it into 2 equal pieces and gave Frank one of them. What part of the whole melon did Frank have?

How to Divide a Fraction by a Whole Number

$$\frac{2}{3} \div 2 =$$

One Way

$$\frac{2}{3} \div 2 = \frac{2}{3} \times \frac{1}{2} = \frac{2}{6} = \frac{1}{3}$$

Another Way

$$\frac{2}{3} \div 2 = \frac{2 \div 2}{3} = \frac{1}{3}$$

Frank had $\frac{1}{3}$ of a melon.

Write the whole number as a fraction with 1 as the denominator. Invert it and multiply. You have multiplied the denominator.

Instead of multiplying the denominator, if the numerator contains the whole number an exact number of times, you may divide the numerator by the whole number.

To divide the numerator of $\frac{2}{3}$ by 2 is to find $\frac{1}{2}$ of $\frac{2}{3}$ which is $\frac{1}{3}$.

Multiplying the denominator of a fraction by a whole number *divides* the fraction.

Dividing the numerator of a fraction by a whole number *divides* the fraction.

Work these examples twice. The first time multiply the denominator. The second time divide the numerator.

1. $\frac{5}{9} \div 5$	6. $\frac{4}{5} \div 2$	11. $\frac{6}{7} \div 3$	16. $\frac{9}{10} \div 3$
2. $\frac{6}{7} \div 6$	7. $\frac{4}{9} \div 2$	12. $\frac{8}{9} \div 4$	17. $\frac{5}{8} \div 5$
3. $\frac{4}{9} \div 4$	8. $\frac{11}{12} \div 11$	13. $\frac{15}{16} \div 5$	18. $\frac{18}{20} \div 6$
4. $\frac{7}{8} \div 7$	9. $\frac{3}{5} \div 3$	14. $\frac{7}{12} \div 7$	19. $\frac{25}{9} \div 5$
5. $\frac{8}{9} \div 8$	10. $\frac{14}{16} \div 7$	15. $\frac{6}{10} \div 3$	20. $\frac{20}{3} \div 10$

ADDITION AND SUBTRACTION

1. $\frac{3}{4} + \frac{2}{3} =$
2. $\frac{5}{8} - \frac{7}{12} =$
3. $\frac{7}{8} - \frac{3}{4} =$
4. $\frac{3}{4} - \frac{3}{10} =$
5. $\frac{4}{5} - \frac{3}{4} =$
6. $\frac{7}{16} + \frac{3}{8} =$
7. $10 - 4\frac{1}{3} =$
8. $20 + \frac{5}{6} =$
9. $2\frac{1}{2} + \frac{3}{8} =$
10. $8\frac{1}{4} - 2\frac{1}{2} =$
11. $7\frac{3}{10} + \frac{1}{2} =$
12. $4\frac{4}{5} - \frac{3}{4} =$
13. $\frac{5}{16} + \frac{3}{4} + \frac{5}{8} =$
14. $6\frac{1}{3} - 3\frac{2}{5} =$
15. $\frac{1}{2} + \frac{3}{4} + \frac{5}{8} =$

MULTIPLICATION AND DIVISION

Cancel when you can:

1. $\frac{5}{8} \times \frac{4}{5} =$
2. $\frac{3}{5} \div \frac{9}{10} =$
3. $16 \times \frac{3}{8} =$
4. $4\frac{2}{3} \div \frac{8}{9} =$
5. $3\frac{1}{4} \div \frac{5}{8} =$
6. $6\frac{2}{5} \times \frac{7}{8} =$
7. $\frac{3}{5} \div 9 =$
8. $\frac{2}{3} \times 15 =$
9. $2\frac{3}{8} \times \frac{3}{4} =$
10. $\frac{3}{4} \div \frac{1}{6} =$
11. $\frac{9}{10} \times \frac{2}{3} =$
12. $24 \div 3\frac{3}{5} =$
13. $\frac{5}{8} \div 2\frac{1}{2} =$
14. $8\frac{3}{9} \times \frac{3}{10} =$
15. $\frac{5}{16} \div \frac{5}{8} =$

FOUR PROCESSES

Cancel when you can:

1. $\frac{1}{4} + \frac{3}{8} + \frac{1}{2} =$
2. $2\frac{3}{4} \div \frac{5}{6} =$
3. $7\frac{3}{8} - 4\frac{3}{4} =$
4. $5\frac{2}{3} \times \frac{3}{8} =$
5. $9 - 6\frac{3}{5} =$
6. $20 \times 4\frac{3}{4} =$
7. $20 \div \frac{8}{9} =$
8. $\frac{7}{12} + 4\frac{2}{3} =$
9. $\frac{5}{16} \div \frac{3}{8} =$
10. $5\frac{1}{4} + 1\frac{5}{6} =$
11. $3\frac{2}{5} \times 8 =$
12. $\frac{7}{8} - \frac{2}{3} =$
13. $8\frac{1}{3} - \frac{3}{4} =$
14. $\frac{3}{5} \div \frac{3}{10} =$
15. $\frac{9}{10} + \frac{3}{4} + \frac{4}{5} =$
16. $\frac{5}{9} \times \frac{3}{10} =$
17. $24 \times 6\frac{3}{8} =$
18. $6\frac{2}{3} - 4 =$
19. $\frac{5}{6} \div 10 =$
20. $\frac{7}{16} + \frac{1}{2} + \frac{5}{8} =$
21. $\frac{2}{3} \times \frac{4}{5} =$

ALICE IN NUMBERLAND

The sixth grade class is going to give a play called *Alice in Numberland* in the assembly hall. The girls are making the costumes and the boys are cutting out the figures and signs to be used on the costumes.

1. The costume for Alice requires $2\frac{1}{4}$ yards of blue paper and $1\frac{7}{8}$ yards of white paper. How much paper is required in all? How much more blue than white?

2. Ten pupils are to be the figures, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Each of these costumes will take $2\frac{1}{4}$ yards of black paper for the background and $\frac{1}{3}$ yard of white for the figure. How much paper is needed for each costume? For all 10?

3. The dance of the fractions is to be given by the smaller pupils. 65 yards of red paper are needed for their costumes. If $2\frac{1}{6}$ yards make one costume, how many costumes can be made?

4. The decimal point and the dollar sign costumes are to be orange on a black background. The dollar sign dress uses $2\frac{5}{8}$ yards and the decimal point requires $2\frac{1}{2}$. How much less is used for the decimal point dress? How much is used for both?

5. The signs $+$, $-$, $\times$ and $\div$ required in all $9\frac{1}{2}$ yd. of black paper and $1\frac{1}{2}$ yd. of white. How much was that?

FINDING THE VALUE OF ONE UNIT

If 9 doughnuts cost 27 cents, what will 15 cost?

$\frac{1}{9}$ of $27 = 3$	One doughnut will cost $\frac{1}{9}$ as much as 9. $\frac{1}{9}$ of 27 cents = 3 cents.
$15 \times 3 = 45$	15 doughnuts will cost 15×3 cents or 45 cents.

15 doughnuts will cost 45 cents.

1. If 2 notebooks cost 30¢, what will 5 cost?

2. Alice paid her club dues for 3 weeks. If she paid 15¢ for 3 weeks, what would be the club dues for a year?

3. If it takes 20 panes of glass for 5 windows, how many panes will be needed for 16 windows?

4. Three families went camping. They paid $58.50 for 3 tents just alike. How much would 5 tents cost at the same rate?

5. If 6 pansy plants cost 30 cents, what will 25 cost?

6. If 7 bus tickets cost 35¢, what would be the cost of 50 tickets?

7. If Mr. Green saves $75 every 3 months, how much will he save in 10 months?

8. If Mary practices her music lesson 3 hours in 2 days, how many hours will she practice in 9 days, if she practices the same length of time each day?

9. Find out prices of fruits and make problems about buying at a fruit stand

ONE NUMBER IS HOW MANY TIMES ANOTHER?

If 6 books of a set cost \$15, what will the set of 24 books cost?

	The cost of 24 books is how many times the cost of 6 books?
$24 \div 6 = 4$	Divide 24 by 6.
$4 \times 15 = 60$	As $24 = 4 \times 6$, the cost of 24 books = 4 times the cost of 6 books.
24 books will cost \$60.	

1. At 3 bunches for 25¢, what will 9 bunches of radishes cost?

2. If a box containing 3 handkerchiefs costs \$1.25, what will a dozen handkerchiefs cost at the same rate?

3. At Christmas time a Sunday school ordered 20 pounds of candy from a candy factory for a party. If they paid at the rate of 5 pounds for \$3.28, what did the 20 pounds cost?

4. Last winter some people ordered a box of oranges from Florida. At the rate of four dozen for \$1.35, what did 12 dozen cost?

5. Mrs. Tilden ordered 30 dozen eggs from a farmer to put down for cooking. He brought her 6 dozen at a time. If the price of 6 dozen was \$1.92, what would the 30 dozen cost at the same rate?

6. Boy Scouts were to act as guides at a convention. One half yard of ribbon made badges for 4 scouts. How much ribbon was needed for 2 troops of 32 scouts each?

FINDING WHAT FRACTIONAL PART ONE NUMBER IS OF ANOTHER

Howard bought 4 ounces of peas to plant in his garden. What part of 16 ounces did he buy?

How to Find What Part One Number Is of Another

4 oz. is $\frac{4}{16}$ of 16 oz.	Write the two numbers as a fraction, using as the denominator the number of which the other is a part.
$\frac{4}{16} = \frac{1}{4}$	Reduce to lowest terms.

Howard bought $\frac{1}{4}$ lb. of peas.

5 is what part of 10,	20,	35,	70,	100?
8 is what part of 24,	32,	64,	40,	128?

SCHOOL PROBLEMS

1. Mabel missed 3 words of the 10 in the spelling lesson. What part of the words did she miss?

2. John missed 6 of the 24 words in his spelling test. What part of the words did he miss?

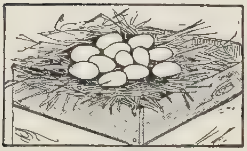
3. Dick is in school 25 hours each week. Five hours of this time are spent studying arithmetic. What part of the time is spent in this way?

4. In a geography test, Anne missed 3 of the 12 questions. What part of the questions did she miss?

5. Eleven pupils of a class of 44 have their names on the honor roll. What part of the class are honor pupils?

6. Nine pupils of a class of 45 failed in their final tests. What part of the class passed?

FINDING THE WHOLE WHEN A FRACTIONAL PART IS GIVEN



John Henry set a hen on some eggs. 9 of the eggs hatched. These were $\frac{3}{4}$ of the eggs in the nest. How many eggs were there in the nest?

$\frac{3}{4}$ of the eggs in the nest are 9 eggs.
$\frac{1}{4}$ of the eggs $= \frac{1}{3}$ of 9 eggs or 3 eggs. Why?
$\frac{4}{4}$ of the eggs $= 4 \times 3$ eggs or 12 eggs. Why?

There were 12 eggs in the nest.

Proof:

$\frac{3}{4}$ of 12 eggs $= \frac{3}{\cancel{4}} \times \overset{3}{\cancel{12}} = 9$ eggs

1. If $\frac{4}{5}$ of a number is 12, what is $\frac{1}{5}$ of the number? What is the number?

2. If $\frac{3}{10}$ of a number is 6, what is $\frac{1}{10}$ of the number? What is the number?

3. If $\frac{2}{3}$ of a number is 4, what is the number?

4. If $\frac{3}{5}$ of a number is 9, what is the number?

Work these examples and prove:

1. 16 is $\frac{2}{3}$ of what number?

2. 24 is $\frac{3}{4}$ of what number?

3. 28 is $\frac{7}{8}$ of what number?

4. 25 is $\frac{5}{6}$ of what number?

5. 100 is $\frac{2}{3}$ of what number?

6. 120 is $\frac{4}{9}$ of what number?

COMPARING NUMBERS

Finding how many times larger or smaller one number is than another is finding the relation or the *ratio* of the two numbers.

The relation or ratio of 2 to 6 is $\frac{1}{3}$. That is, 2 is $\frac{1}{3}$ of 6.

The relation or ratio of 6 to 2 is 3. That is, 6 is 3 times 2.

What is the ratio of 5 to 25? Of 25 to 5?

How to Find the Ratio of One Number to Another

$\frac{5}{25} = \frac{1}{5}$

$\frac{25}{5} = 5$

Write the numbers as a fraction using the first number as the numerator, and the second as the denominator.

Reduce to lowest terms.

The ratio of 5 to 25 is $\frac{1}{5}$. The ratio of 25 to 5 is 5.

Find the ratio of the numbers in each of these groups:

1.	3 to 6	5 to 10	5 to 15	40 to 20
2.	6 to 3	10 to 5	15 to 5	9 to 18
3.	2 to 4	10 to 20	12 to 16	10 to 40
4.	4 to 2	8 to 16	10 to 12	4 to 12

1. Sam picked 8 quarts of strawberries and George picked 12 quarts. Find the ratio of Sam's berries to George's berries.

2. One family uses 12 tons of coal each year and another family uses 20 tons. Find the ratio of the amount used by the first family to that used by the second.

3. Our family spends \$60 a month for food and \$80 a month for rent. Find the ratio of the amount spent for food to that spent for rent.

FRACTIONAL RELATIONS

1. 7 is what part of 8?
2. 9 is what part of 36?
3. 12 is what part of 18?
4. 36 is what part of 48?
5. 27 is $\frac{3}{4}$ of ?
6. 50 is $\frac{5}{9}$ of ?
7. 63 is $\frac{9}{7}$ of ?
8. 42 is $\frac{7}{4}$ of ?

1. What is $\frac{7}{9}$ of 450?
2. What is $\frac{5}{3}$ of 360?
3. What is $\frac{7}{12}$ of 84?
4. What fraction of 56 is 35?
5. What fraction of 49 is 14?
6. What fraction of 72 is 64?
7. Seven-eighths of a number is 63. What is the number? Prove.
8. Five-ninths of a number is 45. What is the number?
9. Two-thirds of a number is 90. What is the number?

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1. Twenty-seven inches is what part of a yard?
2. How much would 24 inches of silk cost at $1.65 a yard?
3. Fourteen ounces is what part of a pound?
4. Twenty quarts is what part of a bushel?
5. Three-fourths of the pupils in the Park Side School attended the party in the gymnasium. Of the 360 pupils in the school, how many attended the party?
6. A barrel of oil holds 50 gallons. When only 14 gallons are left, what fractional part of the oil is left? What fractional part has been used?
7. Three-fourths of the distance between two places is 477 miles. How far apart are the places?

HOW TO WORK PROBLEMS

Before you try to work a problem in arithmetic, read the problem very carefully and be sure that you know what it tells you and what it asks you to find. Then you have to decide how to work the problem. Estimate your answer before working.

Many pupils make mistakes in problems because they do not take enough time to read and understand the problems before they begin to work them.

Read each of these problems and tell:

1. What the problem tells you.
2. What the problem asks you to find.
3. What you must do to find it.

1. In a fifth grade sewing class each girl is to make a book bag. If $\frac{3}{8}$ of a yard of linen is needed for one bag, how much material will be needed for 32 bags?

2. If it takes $12\frac{3}{4}$ inches of cord to tie up one package, how much cord will be used in tying up 24 similar packages?

3. Ruth's mother bought a leg of lamb weighing $6\frac{1}{4}$ pounds at 44¢ a pound and $1\frac{3}{4}$ pounds of steak at 60¢ a pound. What did all of the meat cost?

4. At 48¢ a pound, find the cost of 4 chickens weighing $3\frac{1}{2}$ pounds, $4\frac{3}{4}$ pounds, $5\frac{1}{4}$ pounds and $2\frac{3}{4}$ pounds.

5. A storekeeper bought 120 boxes of writing paper at $16\frac{2}{3}$¢ a box. He sold 90 boxes at 25¢ each and the rest at 18¢ each. How much money did he make?

6. In a test David worked 12 examples in 7 minutes. At the same rate how long would it take to work 36?

TEST IN FRACTIONS

Copy and find the answers:

1. $\frac{1}{2}+\frac{1}{3}$	2. $\frac{7}{8}-\frac{1}{2}$	3. $4\frac{2}{3}+1\frac{3}{4}+2\frac{1}{6}$
4. $3\frac{5}{8}-1\frac{1}{4}$	5. $3\times\frac{1}{8}$	6. $24\times\frac{3}{8}$
7. $\frac{1}{4}\times\frac{2}{3}$	8. $\frac{1}{16}\times 32$	9. $\frac{5}{8}+\frac{3}{16}+\frac{3}{4}$
10. $12\times 5\frac{2}{3}$	11. $15\div\frac{1}{2}$	12. $\frac{3}{4}\div\frac{1}{3}$
13. $\frac{1}{2}\div 4$	14. $33\frac{1}{3}-16\frac{2}{3}$	15. $\frac{5}{6}-\frac{1}{2}$

---

1. Find $\frac{1}{9}$ of 36; $\frac{1}{6}$ of 63; $\frac{1}{8}$ of 56; $\frac{1}{2}$ of 33.
2. 6 is what part of 18? Of 48? Of 54? Of 36? Of 24?
3. 9 is what part of 36? Of 63? Of 45? Of 18? Of 72?
4. 24 is $\frac{2}{3}$ of what number? $\frac{1}{2}$? $\frac{3}{8}$? $\frac{1}{4}$? $\frac{3}{4}$?
5. If $\frac{2}{3}$ of a number is 8, what is the number?
6. If $\frac{4}{5}$ of a number is 24, what is the number?

Find the ratio of the numbers in each of these groups:

12 to 6	10 to 5	8 to 24	5 to 15
5 to 10	9 to 8	10 to 12	24 to 8

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1. $\frac{1}{2}-\frac{1}{6}$	2. $\frac{1}{5}\div 2$	3. $\frac{7}{8}\div\frac{1}{2}$
4. $24\div\frac{1}{3}$	5. $15\times 2\frac{3}{5}$	6. $\frac{3}{5}+\frac{3}{10}+\frac{3}{4}$
7. $\frac{1}{3}\times 2\frac{1}{6}$	8. $\frac{1}{3}\times\frac{3}{8}$	9. $5\frac{5}{6}+2\frac{1}{8}+7\frac{1}{4}$
10. $11\times\frac{1}{10}$	11. $6\frac{5}{6}-3\frac{1}{3}$	12. $2\frac{3}{8}+\frac{1}{4}+1\frac{1}{16}$
13. $13-2\frac{1}{6}$	14. $\frac{15}{16}\times\frac{4}{5}$	15. $\frac{15}{16}\div\frac{5}{8}$

UNITED STATES MONEY

United States money consists of both coins and bills. Here is a list of the coins and the metal used in each:

One cent	copper	Two and one-half dollars	gold
Five cents	nickel	Five dollars	gold
Ten cents	silver	Ten dollars	gold
Twenty-five cents	silver	Twenty dollars	gold
Fifty cents	silver		
Dollar	silver		

Here is a list of United States bills—our paper money. Find out all you can about the paper used in them.

One dollar	Twenty dollars
Two dollars	Fifty dollars
Five dollars	One hundred dollars
Ten dollars	One thousand dollars

MAKING CHANGE

1. Name the coins you should receive in change from 50¢ if you spent:

47¢	9¢	38¢	3¢	40¢	25¢

2. Name the coins you should receive in change from $1.50 if you spent:

$1.10	$1.17	$1.09	$1.21	$1.41	$1.37

3. Name the coins you should receive in change from $1.00 if you spent:

33¢	44¢	79¢	83¢	65¢
58¢	13¢	27¢	93¢	72¢

4. Name the bills and coins you should receive in change from $5.00 if you spent:

$2.98	$1.85	$3.89	$4.57
$.85	$2.65	$1.55	$3.45

DECIMAL FRACTIONS

Tickets for the ball game cost 50 cents. This may be written 50 cents or \$.50 or $\$\frac{1}{2}$.

50 cents = 50 of the 100 cents in a dollar or $\frac{50}{100}$ of a dollar which may be reduced to $\$\frac{1}{2}$.

.50 and $\frac{1}{2}$ are both fractions.

A fraction like .50 is called a *decimal fraction.*

A fraction like $\frac{1}{2}$ is called a *common fraction.*

.50 should be read 50 *hundredths.*

Fractions whose denominators are 10, 100, 1000, or 1 followed by any number of zeros, can be written as decimal fractions. The decimal point shows that the fraction is a decimal fraction. In a decimal fraction, there is one decimal place at the right of the decimal point for each 0 in the denominator of the common fraction.

$\frac{1}{10} = .1$ $\frac{1}{100} = .01$ $\frac{1}{1000} = .001$

Learn the names of the first six decimal places. They are at the right of the decimal point.

Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Units	**Decimal point**	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths
1	5	6	3	0	1	8	.	2	1	3	7	8	5

A *mixed decimal* is a whole number and a decimal used together. 9.5 is a mixed decimal.

The decimal point in a mixed decimal is read *and*. 26.42 is read 26 *and* 42 hundredths.

Read these decimals:

.8	2.25	3.2695	2.755
.08	12.75	18.024	.2755
.008	.892	7.750	.02755
.0008	16.04	216.82	.002755

Write these decimals in figures:

1. Nine tenths; four and twelve hundredths.
2. Sixteen and one hundred fifteen thousandths.
3. Five hundred twenty-four ten-thousandths.
4. Three thousand, one hundred fifty-six millionths.

Write these common fractions as decimals:

$\frac{1}{10}$	$\frac{1}{100}$	$\frac{25}{100}$	$\frac{85}{100}$	$\frac{25}{1000}$	$\frac{625}{10000}$
$\frac{7}{10}$	$\frac{27}{100}$	$\frac{7}{1000}$	$\frac{52}{100}$	$\frac{725}{1000}$	

Annexing zeros at the right of the decimal does not change the value of the decimal. $.7 = .70 = .700$.

To divide a decimal by 10, move the decimal point one place to the left. $1.5 \div 10 = .15$. $15.6 \div 10 = 1.56$.

To multiply a decimal by 10, move the decimal point one place to the right. $1.50 \times 10 = 15.00$. $\$25.65 \times 10 = \$256.50$.

Multiply and divide each of these numbers by 10 and by 100:

26	3	31.4	42.65	3.4

ADDING DECIMALS

John delivers groceries by automobile. One day he drove 3.4 miles on the first trip, 4.25 on the second, .9 on the third and 2.5 on the fourth. How far did he drive?

How to Add Decimals

$$\begin{array}{r} 3.4 \\ 4.25 \\ .9 \\ 2.5 \\ \hline 11.05 \end{array}$$

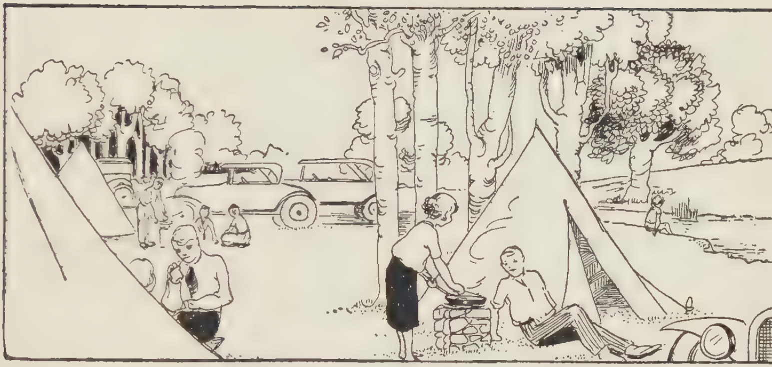
Decimals are added in the same way that dollars and cents are added.

Be sure the decimal points are under each other. Write the decimal point in the answer under the other decimal points.

John drove 11.05 miles in all.

Copy and add:

1. .7 + .6 + .8
2. .9 + .6 + .9
3. .8 + .9 + .6
4. .9 + .8 + .4
5. .7 + .9 + .6
6. .7 + .4 + .7
7. .89 + .91 + .5
8. .9 + .946 + .407
9. .99 + .583 + .651
10. .786 + 9.351 + .98
11. 8.69 + 7.89 + 6.94
12. 69.73 + .643 + 69.9 + .988
13. 89.95 + 8.899 + 966.7 + 7.94
14. 8.65 + 97.64 + .99 + 957.5
15. 8.78 + 76.9 + 9.98 + 268.4
16. 6.285 + .8 + 468.99 + .759
17. 9.8 + 7.95 + 477.588 + 46.6
18. .947 + 5.99 + .5 + 83.82
19. 7.69 + .85 + 6.61
20. 6.68 + .565 + 6.991
21. 7.85 + 3.592 + 9.649
22. 8.857 + .97 + 2.553
23. 99.5 + 554.26 + 9.788 + 62.86 + .676
24. 89.756 + 4.663 + .9 + 863.67 + 46.4 + .849
25. .387543 + 9.8 + 96.94348 + 8.9 + 55.57 + 9.662453



SOME AUTOMOBILE TRIPS

1. Anne was invited to drive with some friends from New York to Albany. On the state road it is 41.8 miles from New York to Peekskill, 32.2 miles from Peekskill to Poughkeepsie, 42.3 miles from Poughkeepsie to Hudson, and 33.1 miles from Hudson to Albany. Find the distance from New York to Albany.

2. It is 43.4 miles from Montgomery, Ala., to Tuskegee, Ala., 152.3 miles from Tuskegee to Atlanta, Ga., and 93.8 miles from Atlanta to Macon, Ga. How far is it from Montgomery, Ala., to Macon, Ga.?

3. It is 27 miles from Niagara Falls, N. Y., to Buffalo, N. Y., 88.3 miles from Buffalo to Erie, Pa., and 102.1 miles from Erie to Cleveland, Ohio. Find the distance from Niagara Falls, N. Y., to Cleveland, Ohio.

4. On the Boston Post Road it is 45 miles from Boston, Mass., to Worcester, Mass., 50.9 miles from Worcester to Springfield, Mass., 26.4 miles from Springfield to Hartford, Conn., and 37.7 miles from Hartford to New Haven, Conn. Find the distance from Boston, Mass., to New Haven, Conn.

5. Last fall John went with his father from their home in New York City to a football game at Cornell University in Ithaca, N. Y. John kept a record of the mileage in his notebook. He found that it is 82.7 miles from New York City to the Delaware Water Gap, Pa., 50.5 miles from the Delaware Water Gap to Scranton, Pa., 62.8 miles from Scranton to Binghamton, N. Y., 22.8 miles from Binghamton to Owego, N. Y., and 28.9 miles from Owego to Ithaca, N. Y. How long was the trip to the football game?

6. Lucy lives in Boston, Mass. Last summer she drove to Belgrade Lakes, Me., for her vacation. How far did she travel if it is 58.0 miles from Boston, Mass., to Portsmouth, N. H., 54.8 miles from Portsmouth to Portland, Me., and 74.8 miles from Portland to Belgrade Lakes, Me.?

7. Last winter Paul drove with his family from Dallas, Texas, to El Paso, Texas. How far did he travel, if it is 99.9 miles from Dallas to Waco, 198.1 miles from Waco to Houston, 221.4 miles from Houston to San Antonio and 596.6 miles from San Antonio to El Paso?

8. It is 94.4 miles from Albany, N. Y., to Utica, N. Y., and 48.7 miles from Utica to Syracuse, N. Y. Find the length of the round trip from Albany to Syracuse.

9. It is 100.2 miles from Los Angeles, Cal., to Santa Barbara, Cal., 355.4 miles from Santa Barbara to San Francisco, Cal., 754.1 miles from San Francisco to Portland, Ore., 166.6 miles from Portland to Tacoma, Wash., and 41.2 miles from Tacoma to Seattle, Wash. How far is it from Los Angeles, Cal., to Seattle, Wash.?

10. Plan a trip you would like to take and find the distances in your geography—or on a road map.

SUBTRACTING DECIMALS

A road-builder had a contract to build 24.52 miles of concrete road. When he had finished 16.2 miles, how many miles of road did he still have to build?

How to Subtract Decimals

$$\begin{array}{r} 24.52 \\ \underline{16.2} \\ 8.32 \end{array}$$

Decimals are subtracted in the same way that dollars and cents are subtracted. Be sure that the decimal points are under each other. Write the decimal point in the answer under the other decimal points.

The road-builder still had 8.32 miles of road to build.

Subtract:

1. 118.61 43.83	2. 97.945 10.09	3. 1191.5 201.9	4. 1.351 .477	5. 134.96 74.87
6. 533.0 348.2	7. 1.796 .93	8. 236.6 166.3	9. 106.18 73.58	10. 168.2 40.5
11. 7.415 .681	12. 75.46 46.09	13. 78.572 21.731	14. 999.02 481.04	15. .8230 .6663
16. 5236.7 2001.6	17. 5447 5203.4	18. 430.18 324.6	19. 15.364 7.465	20. 7494.1 5156.8

21. 10.304 — 8.164	22. 905.2 — 3.59	23. 1303.5 — 718
24. 95.11 — 8.17	25. 68.147 — 33.39	26. 8.2361 — 8.1553
27. 164.79 — 89	28. 754.82 — 106.05	29. 1.2061 — .4735
30. 16.125 — 8.237	31. 154.18 — 88.44	32. 9.1997 — 8.201
33. 130.34 — 91.75	34. 78.725 — 22.306	35. 13.697 — 4.029

CHANGING COMMON FRACTIONS TO DECIMAL FRACTIONS

Mr. Brown bought $\frac{3}{4}$ of a ton of coal and Mr. Jones bought $1\frac{1}{4}$ tons. Change these weights to decimals.

How to Change a Common Fraction to a Decimal

$\frac{3}{4} = 4\overline{)3.00}$ = .75

Place a decimal point after the numerator. Add one or more zeros. Divide by the denominator.

$1\frac{1}{4} = 1 + \frac{1}{4}$

$\frac{1}{4} = 4\overline{)1.00}$ = .25

$1\frac{1}{4} = 1.25$

To change a mixed number to a mixed decimal, change the fraction to a decimal and use this decimal in place of the fraction.

Mr. Brown bought .75 of a ton and Mr. Jones 1.25 tons.

Remember: Adding or taking away zeros at the right of a decimal does not change the value of the decimal.

Change these common fractions to decimal fractions:

1. $\frac{1}{2}$	6. $\frac{2}{3}$	11. $\frac{1}{8}$	16. $\frac{5}{12}$
2. $\frac{1}{3}$	7. $\frac{2}{5}$	12. $\frac{3}{8}$	17. $\frac{7}{10}$
3. $\frac{1}{4}$	8. $\frac{3}{5}$	13. $\frac{5}{8}$	18. $\frac{7}{12}$
4. $\frac{1}{5}$	9. $\frac{4}{5}$	14. $\frac{7}{8}$	19. $\frac{5}{16}$
5. $\frac{1}{6}$	10. $\frac{5}{6}$	15. $\frac{3}{16}$	20. $\frac{9}{16}$

Change these mixed numbers to mixed decimals:

1. $2\frac{1}{4}$	5. $5\frac{1}{8}$	9. $2\frac{7}{8}$	13. $12\frac{1}{5}$
2. $3\frac{1}{2}$	6. $6\frac{2}{3}$	10. $3\frac{4}{5}$	14. $10\frac{5}{12}$
3. $4\frac{1}{3}$	7. $9\frac{3}{8}$	11. $4\frac{3}{10}$	15. $16\frac{2}{3}$
4. $3\frac{2}{5}$	8. $5\frac{5}{8}$	12. $9\frac{3}{4}$	16. $24\frac{7}{8}$

CHANGING DECIMALS TO FRACTIONS

Bill had \$.75 and Mary \$1.25. What fractional part of a dollar did each have?

How to Change a Decimal to a Fraction

$\$.75 = \frac{75}{100} = \frac{3}{4}$ of a dollar

$\$1.25 = 1 + \frac{25}{100} = \$1\frac{1}{4}$

Bill had $\$\frac{3}{4}$ and Mary $\$1\frac{1}{4}$.

To change a decimal to a common fraction, write the decimal as a common fraction. Reduce it to lowest terms.

Change these decimals to common fractions:

.1	.8	1.20	.45	.125	.65
.16	.76	.875	.80	.025	.06

FRACTIONAL PARTS OF A DOLLAR

This table gives a number of the fractional parts of a dollar. Some of them you already know. Learn the whole table. It will save you much time.

$50¢ = \frac{1}{2}$ of \$1	$16\frac{2}{3}¢ = \frac{1}{6}$ of \$1
$25¢ = \frac{1}{4}$ of \$1	$12\frac{1}{2}¢ = \frac{1}{8}$ of \$1
$75¢ = \frac{3}{4}$ of \$1	$37\frac{1}{2}¢ = \frac{3}{8}$ of \$1
$33\frac{1}{3}¢ = \frac{1}{3}$ of \$1	$62\frac{1}{2}¢ = \frac{5}{8}$ of \$1
$66\frac{2}{3}¢ = \frac{2}{3}$ of \$1	$87\frac{1}{2}¢ = \frac{7}{8}$ of \$1
$20¢ = \frac{1}{5}$ of \$1	$10¢ = \frac{1}{10}$ of \$1
$40¢ = \frac{2}{5}$ of \$1	$8\frac{1}{3}¢ = \frac{1}{12}$ of \$1

USING FRACTIONAL PARTS

A dealer bought 16 flash-lights at \$.75 apiece. How much did they cost?

$16 \times \$.75 =$

$$\begin{array}{r} \$.75 \\ 16 \\ \hline 450 \\ 75 \\ \hline \$12.00 \end{array}$$

$\overset{4}{\cancel{16}} \times \$\frac{3}{\cancel{4}} = \$12$

$16 \times .75$ is the same as $16 \times \frac{3}{4}$

Finding $\frac{3}{4}$ of 16 is quicker and easier than multiplying $16 \times \$.75$.

The flash-lights cost \$12.00.

PROBLEMS

1. When watermelons are selling for 60 cents each, how much will 25 cost?

2. When apples cost $33\frac{1}{3}$¢ a peck, how much will 9 pecks cost?

3. At $12\frac{1}{2}$ cents apiece find the cost of 48 grapefruit.

4. When grapes are selling at wholesale for $37\frac{1}{2}$ cents a basket, find the cost of 40 baskets.

5. When a dealer pays $66\frac{2}{3}$ cents for a basket of peaches, find the cost of 24 baskets.

6. If each ride on a 50-trip railroad ticket costs 75 cents, find the cost of the ticket.

7. When bananas sell by the bunch at 25 cents a dozen find the cost of 2 bunches that contain 8 dozen each.

8. When trolley tickets cost $8\frac{1}{3}$ cents apiece, when bought by the dozen, what will 12 cost?

MULTIPLYING A DECIMAL BY A WHOLE NUMBER

One day a coal company sent away a trainload of 36 cars of coal. There was an average of 35.25 tons of coal in each car. How many tons were there on the train?

How to Multiply a Decimal by a Whole Number

$$\begin{array}{r} 35.25 \\ 36 \\ \hline 21150 \\ 10575 \\ \hline 1269.00 \end{array}$$

A decimal is multiplied by a whole number in the same way that dollars and cents are multiplied. Point off from the right as many decimal places in the product as there are decimal places in both the multiplicand and the multiplier.

There were 1269 tons of coal on the train.

Copy and multiply:

1.	65.6 × 5	8.	47.92 × 60	15.	7.846 × 8	22.	890.8 × 84
2.	32.495 × 909	9.	3.485 × 79	16.	64.68 × 86	23.	9.008 × 49
3.	73.735 × 97	10.	86.5 × 75	17.	49.78 × 680	24.	7.446 × 89
4.	809.8 × 47	11.	4.686 × 7600	18.	8.96 × 88	25.	6.548 × 67
5.	.9758 × 96	12.	478.6 × 706	19.	4.876 × 89	26.	984.4 × 76
6.	6.3457 × 68	13.	5.327 × 96	20.	.202 × 33	27.	81.65 × 57
7.	947.3 × 870	14.	.6098 × 97	21.	158.6 × 705	28.	469.3 × 98

MULTIPLYING A DECIMAL BY A DECIMAL

During a test the officers of a railroad kept the exact time made by a new train and found it averaged 46.9 miles an hour for 9.76 hours. How far did the train go?

How to Multiply a Decimal by a Decimal

46.9 9.76 2814 3283 4221 457.744	Multiply as with whole numbers. Point off, from the right, as many decimal places in the product as there are decimal places in both the multiplicand and the multiplier. The train went 457.744 miles.

Copy and multiply:

1.	68.35×7.8	11.	$50.05 \times .57$
2.	$458.6 \times .97$	12.	6.478×6.8
3.	7.008×7.683	13.	$746.8 \times .06$
4.	29.6×39.06	14.	7.354×70.9
5.	80.473×4.07	15.	57.69×8.07
6.	6.045×7.97	16.	743.8×78.7
7.	$.897 \times 54.6$	17.	$.5685 \times 2.57$
8.	17.86×75.05	18.	39.64×70.7
9.	$3.646 \times .089$	19.	$748.6 \times .887$
10.	$.3068 \times 7.97$	20.	9.967×6.89

1. A taxicab driver is paid $.75 per hour. How much does he earn in 8.25 hours?

2. The Empire State Express runs at the rate of 48.8 miles per hour. How far does it go in 6.5 hours?

USING DECIMALS IN PROBLEMS

1. At \$.85 a square yard, what will be the cost of 15.5 square yards of linoleum?

2. At the rate of 42.75 miles per hour, how far will a train travel in 9.5 hours?

3. When coal is selling at \$12.75 a ton, how much will 27.75 tons cost?

4. If a taxicab driver charges \$2.80 an hour, what will be the charge for $5\frac{1}{4}$ hours?

5. At \$3.37 a yard, how much will 64.5 yards of cloth cost?

6. At \$14.85 a ton, how much will 14.8 tons of coal cost?

7. A farmer's average production of corn per acre was 82.5 bushels. How many bushels did he raise in a field of 19.5 acres?

8. On a long automobile trip Mrs. Holmes drove 212.8 miles the first day, 196.3 miles the second day and 220.5 miles the third. How far did she drive during the three days? She had planned a trip of 750 miles. How far had she still to go?

9. On its trial test one of the United States battleships averaged 18.35 miles per hour. At this rate how far would it go in 4.75 hours?

10. On a trip in the country Frank drove his father's car at the rate of 23.75 miles per hour. At that rate how far could he go in 7.5 hours?

11. Mr. Smith earns \$6.75 a day. How much can he earn in 9.5 weeks if he works 6 days each week?

DIVIDING A DECIMAL BY A WHOLE NUMBER

On the Pennsylvania Railroad it is 226.2 miles from New York to Washington. A fast express train takes 5 hours to make the trip, and a freight train takes 15 hours. Find the number of miles each of these trains runs per hour.

How to Divide a Decimal by a Whole Number

$$\begin{array}{r} 45.24 \\ 5\overline{)226.20} \end{array}$$

Write the decimal point in the quotient over the decimal point in the dividend. Divide.

$$\begin{array}{r} 15.08 \\ 15\overline{)226.20} \\ \underline{15} \\ 76 \\ \underline{75} \\ 1\,20 \\ \underline{1\,20} \end{array}$$

When there is a remainder, we sometimes add zeros to the dividend and continue dividing to find a quotient without a remainder if possible.

The express train runs 45.24 miles per hour.

The freight train runs 15.08 miles per hour.

Remember: If there are vacant places between the decimal point and the figures of the quotient, write a zero in each vacant place.

$$\begin{array}{r} .\ 201 \\ 8\overline{).1608} \end{array} \qquad \begin{array}{r} .0201 \\ 8\overline{).1608} \end{array}$$

Copy and divide:

1. $2\overline{)88.06}$	5. $9\overline{)901.8}$	9. $4\overline{)1.608}$	13. $5\overline{).54}$
2. $6\overline{).1206}$	6. $7\overline{).714}$	10. $4\overline{).1204}$	14. $6\overline{)2.502}$
3. $3\overline{)3.06}$	7. $2\overline{).5053}$	11. $14\overline{).483}$	15. $19\overline{).4009}$
4. $5\overline{).1626}$	8. $16\overline{).8104}$	12. $32\overline{)13.92}$	16. $8\overline{)3.216}$

DIVIDING A DECIMAL BY A DECIMAL

We know that multiplying both terms of a fraction by the same number does not change the value of the fraction.

$$\frac{12}{4} \times \frac{10}{10} = \frac{120}{40} = \frac{12}{4}$$

A fraction expresses division. The numerator is the dividend and the denominator is the divisor. $\frac{12}{4}$ means exactly the same thing as $12 \div 4$. As we can multiply both terms of $\frac{12}{4}$ by any number without changing the value of the fraction, we can also multiply both the dividend and the divisor of $4\overline{)12}$ by any number and still have the same quotient. $4\overline{)12} = 3$. $40\overline{)120} = 3$.

Divide: $.84 \div .4$

$$.4\overline{).84} = \frac{.84}{.4} \qquad \frac{.84 \times 10}{.4 \times 10} = \frac{8.4}{4} = 4\overline{)8.4}^{\,2.1} \qquad .4\overline{).84} = 2.1$$

Multiplying both terms of $\frac{.84}{.4}$ by 10, and then dividing, gives the same answer as if we had divided $\frac{.84}{.4}$. It is easier to use $4\overline{)8.4}$, as it has a whole number for a divisor. We made the divisor a whole number by multiplying it by 10. If we multiply the divisor by 10, we must also multiply the dividend by 10.

Remember:

When dividing by a decimal, move the decimal point in the divisor as many places to the right as is necessary to make it a whole number. Then move the decimal point in the dividend the same number of places to the right, adding zeros if they are needed.

DIVIDING A WHOLE NUMBER BY A DECIMAL

A farmer has 12 tons of lime. How many acres can he fertilize if he uses .6 of a ton per acre? If he uses 1.5 tons per acre?

How to Divide a Whole Number by a Decimal

$$.6\overline{)12} = 6\overline{)120.}$$

$$\begin{array}{r} 20. \\ 6\overline{)120.} \end{array}$$

$$1.5\overline{)12} = 15\overline{)120.}$$

$$\begin{array}{r} 8. \\ 15\overline{)120.} \\ \underline{120} \end{array}$$

Before dividing, make the divisor a whole number. Add as many zeros to the dividend as there were decimal places in the divisor. Place a decimal point after the last zero.

Place the decimal point in the quotient over the decimal point in the dividend.

Divide.

Using .6 of a ton the farmer can fertilize 20 acres.

Using 1.5 tons the farmer can fertilize 8 acres.

Remember: When a division in decimals is inexact, place + after the last figure of your quotient. Carry every inexact division to at least 3 decimal places unless otherwise instructed.

$$\begin{array}{r} .438+ \\ 7\overline{)3.068} \end{array}$$

Copy and divide:

1. $.5\overline{)2530}$	2. $.07\overline{)2268}$	3. $.2\overline{)1578}$	4. $.04\overline{)3869}$
5. $.4\overline{)1834}$	6. $.007\overline{)4725}$	7. $.003\overline{)255}$	8. $.09\overline{)7074}$
9. $.005\overline{)395}$	10. $.08\overline{)7498}$	11. $.6\overline{)4134}$	12. $.03\overline{)2037}$
13. $.06\overline{)4413}$	14. $.08\overline{)6849}$	15. $.9\overline{)4487}$	16. $.71\overline{)6958}$

DIVIDING A DECIMAL BY A DECIMAL

A racing boat ran 17.29 miles in .7 of an hour. A motor boat ran the same distance in 1.9 hours. How far did each boat go in an hour?

How to Divide a Decimal by a Decimal

$.7\overline{)17.29} = 7\overline{)172.9}$ $\begin{array}{r} 24.7 \\ 7\overline{)172.9} \end{array}$	Before dividing, make the divisor a whole number. Move the decimal point in the dividend as many places to the right as there were decimal places in the divisor.
$1.9\overline{)17.29} = 19\overline{)172.9}$ $\begin{array}{r} 9.1 \\ 19\overline{)172.9} \\ \underline{171} \\ 1\,9 \\ \underline{1\,9} \end{array}$	Place the decimal point in the quotient over the decimal point in the dividend. Divide. The racing boat ran 24.7 miles in an hour. The motor boat ran 9.1 miles in an hour.

Copy and divide:

1. $68.85 \div .9$	6. $.489 \div .005$	11. $2966 \div 4.2$
2. $4.809 \div .07$	7. $.3876 \div 7.7$	12. $71.3 \div 9.4$
3. $780.1 \div 9.1$	8. $.544 \div .83$	13. $1973.8 \div .3$
4. $1.7 \div .323$	9. $5.809 \div .006$	14. $269 \div .007$
5. $44.8 \div .08$	10. $39.4 \div .004$	15. $190.1 \div 2.02$

USING DECIMALS IN DIVISION

One summer 16 boys raised 116 bushels of potatoes. What was each boy's share?

$$\begin{array}{r} 7 \\ 16\overline{)116} \\ \underline{112} \\ 4 \end{array} \qquad \begin{array}{r} 7\frac{1}{4} \\ 16\overline{)116} \\ \underline{112} \\ 4 \end{array}$$

$$\begin{array}{r} 7.25 \\ 16\overline{)116.00} \\ \underline{112} \\ 4\,0 \\ \underline{3\,2} \\ 80 \\ \underline{80} \end{array}$$

Dividing 116 by 16 leaves a remainder of 4.

Each boy's share was 7 whole bushels and there were 4 bushels over.

Using the remainder as a fraction each boy's share was $7\frac{4}{16}$ or $7\frac{1}{4}$ bushels.

By adding zeros after the decimal point in the dividend, the division can be carried on. This will sometimes give a quotient with no remainder.

Each boy's share was 7.25 bushels.

Find the quotients:

1. $4\overline{)349}$	4. $5\overline{)48.7}$	7. $8\overline{)45.2}$	10. $6\overline{)519}$
2. $75\overline{)96}$	5. $25\overline{)18.8}$	8. $4\overline{)27.6}$	11. $625\overline{)70}$
3. $228\overline{)193.8}$	6. $84\overline{)1116}$	9. $56\overline{)421.3}$	12. $44\overline{)275.11}$

1. If the cost of mining 212 tons of soft coal is \$479.75, what is the cost per ton?

2. An aviator drove his plane 567 miles in 5.4 hours. How many miles did he average an hour?

3. Harvey agreed to take care of Mrs. Wade's garden for \$24 a month. The first month he worked 75 hours. How much did he earn per hour?

USING DECIMALS IN PROBLEMS

1. Some Boy Scouts took 18.75 lb. of bacon on a camping trip. If they used 1.25 lb. a day; how long would the bacon last?

2. A man purchased 16.8 tons of coal for the winter. If he used 2.4 tons each month, how long did the coal last?

3. On a long trip Fred's father drove his car 75.6 miles on 4.2 gallons of gasoline. Find the average number of miles per gallon.

4. Henry rode his bicycle 28.6 miles in 2.6 hours. Find his average speed.

5. A man in charge of a boys' camp allowed each boy a daily ration of 3.2 ounces of sugar. How long would 22.4 ounces of sugar last one boy?

6. A cruiser has a speed of 30.5 miles an hour. How long would it take it to go 274.5 miles?

7. One year, a National League player had a batting average of .296. Another player had a batting average of .268. Find the difference in their batting averages.

8. Henry raised 728.75 bu. of corn on 8.4 acres. What was the average yield per acre?

9. A windmill pumped 380.25 gal. of water in 18.5 hours. What was the average amount pumped each hour?

10. During a stormy week the rainfall amounted to 3.1722 inches. Find the average daily rainfall.

11. During the summer vacation a boy worked 12.5 days and earned $19.25. What did he average a day?

MULTIPLYING AND DIVIDING BY 10, 100 AND 1000

$49 \times 10 = 490$	To multiply a whole number by 10, annex one 0.
$49 \times 100 = 4900$	To multiply a whole number by 100, annex two 0's.
$49 \times 1000 = 49000$	To multiply a whole number by 1000, annex three 0's.
$7.1256 \times 10 = 71.256$	To multiply a decimal by 10, move the decimal point one place to the right.
$7.1256 \times 100 = 712.56$	To multiply a decimal by 100, move the decimal point two places to the right.
$7.1256 \times 1000 = 7125.6$	To multiply a decimal by 1000, move the decimal point three places to the right.
$457 \div 10 = 45.7$	To divide a whole number by 10, point off one decimal place from the right.
$457 \div 100 = 4.57$	To divide a whole number by 100, point off two decimal places from the right.
$457 \div 1000 = .457$	To divide a whole number by 1000, point off three decimal places from the right.
$45.7 \div 10 = 4.57$	To divide a decimal by 10, move the decimal point one place to the left.
$45.7 \div 100 = .457$	To divide a decimal by 100, move the decimal point two places to the left.
$45.7 \div 1000 = .0457$	To divide a decimal by 1000, move the decimal point three places to the left.

Multiply each of the following numbers by 10, by 100 and by 1000:

35	.8	12.5	438
112	1.45	.1386	73.6
365	25.125	4.508	317
403	6.1982	7.93	.317
1255	.5368	1.7536	3.17

Divide each of the following numbers by 10, by 100 and by 1000:

74	2.65	162	276
625	56.351	74.86	27.6
485	61.39	937.1	2.76
1763	418.5	5920.4	.276
2500	75.829	3.658	982

1. 17,000 bricks were used in the bath house in Lincoln Park. At $32.50 per thousand, what was the amount of the bill for the bricks?

2. The freight bill for father's car was $16.73. If the car weighed 1900 pounds, what was the freight charge for a hundred pounds?

3. Five hundred pounds of ice are bought for the school lunch room in a week. What does it cost at 50¢ for a hundred pounds?

4. Bob's record for the hundred yard dash was 14 seconds. What was his average rate per second?

5. A ten-pound box of Christmas candy cost $3.55. What was the price per pound?

6. If walnut meats cost 65¢ a pound, what would be the price of ten pounds at the same rate?

7. Red Cross buttons cost $4.86 per thousand. What is the cost of one button?

BUYING BY THE HUNDRED AND THOUSAND

A rose grower advertised bushes at $55 a hundred or $350 a thousand. What would be the cost of 265 bushes? Of 1334 bushes?

2.65 55 ———— 1325 1325 ———— 145.75	$55 is the price of 100 bushes. 265 equals 2 hundreds and $\frac{65}{100}$ of another hundred. Write it as 2.65. Multiply in the easier way: 2.65 × $55 = $145.75
1.334 350 ———— 66700 4002 ———— 466.900	$350 is the price of 1000 bushes. 1334 equals 1 thousand and $\frac{334}{1000}$ of another thousand. Write it as 1.334. 1.334 × $350 = $466.90. 265 bushes would cost $145.75. 1334 bushes would cost $466.90.

Tell how many hundred pounds there are in:

1263 lb. 4589 lb. 7437 lb. 75 lb.

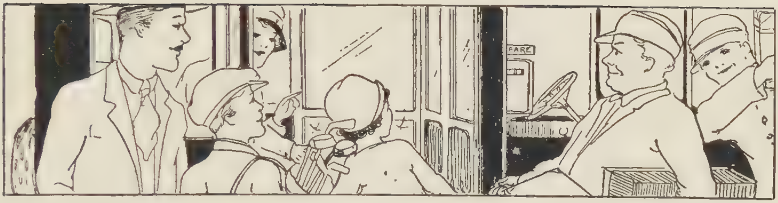
Tell how many thousand feet there are in:

7890 ft. 16232 ft. 601 yd. 196 ft.

1. Mr. Cooper bought 7366 ft. of lumber at $77 per thousand feet. How much did the lumber cost?

2. A foundry bought three different kind of bricks: 36000 costing $31.75 a thousand; 17000 costing $42.25 a thousand; 9000 costing $63.35 a thousand. Find the cost of all the bricks.

3. A farmer received $2.98 per hundred pounds for milk in January; $2.56 in May; and $2.24 in August. He sold 1822 lb. in January, 2433 lb. in May, and 3167 lb. in August. How much did he receive each month? In all three months?



RIDING IN A TAXICAB

1. A cab company charges 15 cents for the first $\frac{1}{4}$ of a mile and 10 cents for each $\frac{1}{4}$ of a mile after the first. Find the fare for riding $1\frac{1}{2}$ miles from the Grand Central Station in New York.

2. It is two miles from the Broad Street Station to the Jefferson Hotel in Richmond. The Yellow Cab fare is 15 cents for the first $\frac{1}{4}$ of a mile and 10 cents for each $\frac{1}{4}$ of a mile after the first. Find the cost of the round trip from the Broad Street Station to the Jefferson Hotel.

3. The Red and White Cab Company charges 15 cents for the first $\frac{1}{4}$ of a mile and 5 cents for each $\frac{1}{4}$ of a mile after the first. Find the fare paid by a man who rode $3\frac{1}{4}$ miles.

4. The City Cab Company charges 25 cents for the first $\frac{1}{4}$ of a mile and 15 cents for each $\frac{1}{4}$ of a mile after the first. Find the fare paid by a woman who rode $1\frac{3}{4}$ miles in a City Cab taxi. She gave the driver a two-dollar bill. How much change was due her?

5. Find the fare for riding $2\frac{1}{4}$ miles in a taxicab if the rate is 20 cents for the first $\frac{1}{2}$ mile and 5 cents for each $\frac{1}{4}$ of a mile after the first.

6. In a certain city there are 16 blocks to the mile. How much should a cab driver charge to ride 24 blocks if his rate is 15 cents for the first $\frac{1}{4}$ of a mile and 10 cents for each $\frac{1}{4}$ of a mile after the first?

DECIMAL TEST

Copy and add:

1. .97 + 9.86 + 7.984 + .91 + 9.59 + .843
2. 9.97 + .8578 + 86.64 + .77 + 7.2861 + .56
3. 9.8 + 62.4 + 56.9 + 98.952 + 9.8 + 45.639
4. .5254 + 74.332 + 9.487 + 46.996 + 9.8765 + .477
5. 859.883 + 98.64 + 65.7 + 8.756 + 696.35 + 5.89
6. 1.454 + .31320 + 8.41234 + 5.6359 + 3.4376 + .01742

Subtract without copying:

1.

13.597	1.3035	169.46	1115.3
4.429	.719	78.5	167.5

2.

149.59	16.817	1366.1	101.62
90.9	9.34	662.3	65.42

3.

14.828	974.15	7.5274	127.587
6.058	606.81	.6151	41.723

Copy and multiply:

1. 6.17 × 507	2. 37.02 × 376	3. 8.09 × .94	4. 5.639 × .08
5. 156.8 × 9.5	6. 2.395 × .907	7. 49.86 × 607	8. 807.4 × .89

Copy and divide:

1.	$7\overline{)256.9}$	$4\overline{)35.868}$	$.6\overline{)5808}$	$.7\overline{)4088}$
2.	$9\overline{)7888.5}$	$3\overline{)2.3895}$	$8\overline{)46.92}$	$5\overline{).398}$
3.	$.02\overline{).1579}$	$.9\overline{)85.167}$	$.64\overline{)18896}$	$4.9\overline{)15.974}$

TESTING OUR PROGRESS

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1.
$$\begin{array}{r} \$699.75 \\ 36.99 \\ 59.97 \\ 487.88 \\ 598.69 \\ 86.97 \\ 342.87 \\ \hline \end{array}$$

2.
$$\begin{array}{r} \$14819.61 \\ -9342.83 \\ \hline \end{array}$$

3.
$$\begin{array}{r} \$89.74 \\ \times 98 \\ \hline \end{array}$$

4. $.57\overline{)562.59}$

5. $9.3\overline{)5356.80}$

6. $72 \div \frac{7}{8} =$

7. $1\frac{7}{8} \times 2\frac{2}{3} =$

8. $.83 - .024 =$

9. If 1000 envelopes cost \$2.80, what will 200 cost?

10. What will $5\frac{1}{4}$ tons of coal cost at \$14.75 a ton?

11. A boy ran 100 yards in 12.5 seconds. What was his average number of feet per second?

12. If you can average 3 examples in 2 minutes, how long will it take you to do 15 examples?

13. If it cost a manufacturer \$400 to make 268 sweaters, what is the manufacturing cost of each?

14. If 208 bricks are needed for one row in a wall, how many bricks would be needed for 694 rows?

15. $31\frac{1}{2}$ gal. $\div 4 =$

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

TESTING OUR PROGRESS

Many sixth grade pupils can do all of these examples in 12 minutes. How many can you do?

At the end of 12 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $$\begin{array}{r} \$7.28 \\ .99 \\ 1.86 \\ .63 \\ 7.17 \\ \underline{8.56} \end{array}$$

2. $$\begin{array}{r} \$1479.30 \\ \underline{-508.72} \end{array}$$

3. $$\begin{array}{r} 69.48 \\ \underline{\times .67} \end{array}$$

4. $7.3\overline{)532.9}$

5. Change $\frac{7}{8}$ to a decimal.

6. Write in a column and add:

   $.57 + 7.8 + .006 + 1.72 + .87$

7. Add: $4\frac{1}{2} + 2\frac{3}{4} + 7\frac{7}{8}$.

8. Subtract: $3\frac{7}{8}$ from $6\frac{2}{3}$.

9. 30 is $\frac{2}{3}$ of what number?

10. $3\frac{1}{3}$ is what part of 10?

11. $36 \div \frac{9}{4} =$

12. Multiply 36 by .098.

13. Find $\frac{1}{8}$ of 16.08 yards.

14. $.0520 \div 8 =$

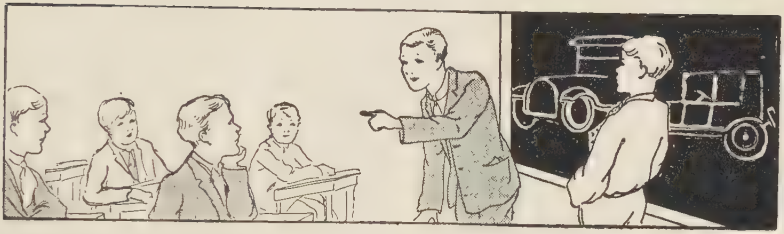
15. Find the quotient of .485 divided by 5.

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

SIXTH GRADE

SECOND HALF



PLAYING SALESMAN

1. Dick and George decided to be automobile salesmen and sell a car to Ted. Dick sold the Morespeed car and George, the Traveler. Here are the prices:

Morespeed Coach	$1445	Traveler Coach	$1290
Morespeed Sedan	$1690	Traveler Sedan	$1405

Which sedan costs more? Which coach? What is the difference in the cost of the sedan and the coach of each make?

2. The Morespeed car can be driven 14 miles on a gallon of gasoline and the Traveler uses a gallon for 11 miles. How many gallons would be required for a 500-mile trip by a Morespeed car? By a Traveler?

3. The Morespeed sedan weighs 3100 lb. and the Traveler weighs 2900 lb. If the freight rate is $2.34 per hundredweight, what would the freight bill be for each? Which bill would be larger? How much?

4. How much would a Morespeed coach cost Ted, if beside the cost of the car, $1445, he had to pay $72.54 for freight, $39.50 for a bumper, $4.75 for a windshield cleaner, and $15.00 for his license plates?

ADDITION DRILL

First be sure and then be quick.

Copy, add and check:

1.	2.	3.	4.	5.
\$15.33	\$512.50	\$24.94	\$10.70	\$57.15
21.34	11.21	12.01	18.57	14.53
13.16	414.00	20.10	64.04	40.10
34.16	52.27	31.39	24.23	33.17
21.04	112.02	12.10	21.25	12.20

Copy and add:

1. 597.99 + 96.8 + 559.64 + 86.8
2. 6.54 + 98.35 + 3.487 + 16.98 + 37.936
3. 7.46 + 3578.2 + 476.8 + 321.97 + 7042.67
4. 9.045 + 53.21 + 12.202 + .353 + 26.411
5. 80.9 + 406.1 + 56.09 + 60.51 + 418.03
6. .917 + 3.08 + 5.531 + 92.27 + 8.748
7. 8.89 + 64.18 + 581.77 + 206.3 + 82.15
8. .676 + 8.58 + 105.38 + 29.77 + 6.887
9. 97.8 + 883.7 + 798.6 + 78.96 + 654.76
10. 93.04 + 1.226 + 46.580 + 54.87 + 7.668

Add without copying:

1.	2.	3.	4.
\$245.79	\$898.95	\$43.85	\$87.90
826.53	59.97	92.79	74.87
787.79	388.94	6.54	53.46
66.39	678.98	48.65	27.86
956.84	55.65	25.49	67.91

SUBTRACTION DRILL

First be sure and then be quick.

Subtract without copying:

1.	8.14 3.397	159.16 90.29	15.119 7.62	1.4963 .5865
2.	103.35 18.4	17.953 9.338	136.66 66.3	.6182 .3582
3.	14.82 6.047	7.415 .681	.7549 .4616	157.872 72.231
4.	9.9902 4.8104	.823 .6673	142.367 80.016	.8622 .3128
5.	1.6991 .857	11.153 9.121	1.1548 .652	.7083 .3563
6.	1.044 .643	120.003 69.802	11.479 3.9	1.195 .4099
7.	63.433 46.4772	9.536 .747	.5847 .439	985.22 586.76
8.	\$177.82 87.49	\$105.70 43.44	\$10.33 1.84	\$158.06 49.59

MULTIPLICATION DRILL

First be sure and then be quick.

Multiply:

1. 2.095 × 8	5. 80.74 × 900	9. .7091 × 21	13. 750.3 × 17
2. 94.86 × 71	6. 7.829 × 26	10. 513.6 × 62	14. .3875 × 405
3. 80.49 × 3.2	7. 12.35 × .39	11. 16.49 × .045	15. 808.2 × 51.4
4. .4096 × .96	8. 2.601 × 80.7	12. 132.6 × .708	16. 38.75 × 4.05

MULTIPLYING DOLLARS AND CENTS

1. $66.47 × 60	6. $38.64 × 7	11. $109.53 × 7	16. $85.79 × 809
2. $86.15 × 5	7. $50.39 × 8	12. $69.35 × 9	17. $865.12 × 505
3. $89.08 × 4	8. $247.86 × 6	13. $47.86 × 708	18. $7.43 × 698
4. $80.74 × 9	9. $65.08 × 8	14. $87.40 × 98	19. $3.26 × 409
5. $35.92 × 9	10. $67.02 × 3	15. $9.23 × 706	20. $7.14 × 478

DIVISION DRILL

First be sure and then be quick.

Divide:

1.	$7\overline{)256.9}$	$6\overline{)40.68}$	$4\overline{)2.757}$	$9\overline{).8487}$
2.	$8\overline{).6664}$	$5\overline{)34.85}$	$3\overline{)2.388}$	$7\overline{).6874}$
3.	$6\overline{).3559}$	$8\overline{)77.92}$	$9\overline{)657.3}$	$4\overline{)2.188}$
4.	$3\overline{).2545}$	$2\overline{)15.78}$	$7\overline{).3794}$	$9\overline{)77.85}$
5.	$8\overline{)4.520}$	$4\overline{)35.68}$	$3\overline{)2.289}$	$5\overline{)477.5}$
6.	$2.1\overline{)12.39}$	$.31\overline{)2.697}$	$.42\overline{)190.5}$	$51\overline{)44.37}$
7.	$.019\overline{).1767}$	$2.9\overline{)20.62}$	$4.9\overline{)4.704}$	$.68\overline{).5315}$
8.	$.22\overline{)1.958}$	$.032\overline{).2496}$	$5.2\overline{)33.81}$	$.72\overline{)7.128}$
9.	$2.5\overline{)24.25}$	$4.5\overline{)4.005}$	$.66\overline{)55.44}$	$8.4\overline{)655.4}$
10.	$7.7\overline{)7.164}$	$.58\overline{)27.84}$	$9.1\overline{)76.65}$	$.48\overline{).4272}$

FRACTIONS AND DECIMALS

Change the following fractions to decimals:

$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{8}$	$\frac{3}{8}$
$\frac{5}{8}$	$\frac{7}{8}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{10}$	$\frac{7}{10}$	$\frac{7}{12}$
$\frac{8}{100}$	$\frac{9}{10}$	$\frac{1}{20}$	$\frac{1}{25}$	$\frac{1}{6}$	$\frac{5}{12}$	$\frac{7}{100}$

Change the following decimals to common fractions or mixed numbers:

.5	.2	.75	$.33\frac{1}{3}$	.4	$.66\frac{2}{3}$	.8
$.12\frac{1}{2}$	.3	.60	.80	$.87\frac{1}{2}$	1.5	4.25
.7	$.16\frac{2}{3}$	$.62\frac{1}{2}$	1.25	$.37\frac{1}{2}$	$.8\frac{1}{3}$	1.6

FRACTIONS

Add:

1. $\frac{5}{8}+\frac{1}{8}$
2. $\frac{1}{4}+\frac{3}{8}$
3. $\frac{7}{8}+\frac{1}{2}$
4. $\frac{5}{6}+\frac{3}{4}$
5. $\frac{3}{10}+\frac{1}{2}$
6. $\frac{2}{3}+\frac{3}{8}$
7. $\frac{3}{4}+\frac{1}{2}+\frac{5}{8}$
8. $\frac{1}{2}+\frac{1}{8}+\frac{1}{3}$
9. $\frac{2}{3}+\frac{3}{8}+\frac{3}{4}$
10. $\frac{3}{10}+\frac{1}{2}+\frac{2}{3}$
11. $\frac{5}{6}+\frac{3}{4}+\frac{7}{8}$
12. $\frac{5}{12}+\frac{1}{8}+\frac{1}{4}$
13. $5\frac{2}{3}+6$
14. $8+4\frac{3}{5}$
15. $2\frac{1}{4}+\frac{5}{8}$
16. $8\frac{1}{2}+5\frac{1}{4}$
17. $7\frac{7}{8}+4\frac{2}{3}$
18. $9\frac{1}{5}+6\frac{1}{2}+7\frac{2}{3}$

Subtract:

1. $\begin{array}{r}\frac{3}{4}\\ \underline{\frac{1}{4}}\end{array}$
2. $\begin{array}{r}\frac{3}{4}\\ \underline{\frac{1}{2}}\end{array}$
3. $\begin{array}{r}\frac{3}{5}\\ \underline{\frac{1}{2}}\end{array}$
4. $\begin{array}{r}9\frac{5}{8}\\ \underline{5\phantom{\frac{1}{2}}}\end{array}$
5. $\begin{array}{r}6\frac{3}{4}\\ \underline{4\frac{1}{4}}\end{array}$
6. $\begin{array}{r}9\frac{7}{8}\\ \underline{5\frac{3}{4}}\end{array}$
7. $\begin{array}{r}6\frac{1}{3}\\ \underline{4\frac{3}{4}}\end{array}$
8. $\begin{array}{r}8\frac{2}{5}\\ \underline{6\frac{1}{2}}\end{array}$
9. $\begin{array}{r}10\frac{1}{4}\\ \underline{5\frac{5}{8}}\end{array}$
10. $\begin{array}{r}10\\ \underline{7\frac{1}{2}}\end{array}$
11. $\begin{array}{r}8\\ \underline{5\frac{3}{5}}\end{array}$
12. $\begin{array}{r}12\\ \underline{6\frac{3}{4}}\end{array}$

Multiply:

1. $4\times\frac{7}{8}$
2. $\frac{3}{4}\times 8$
3. $\frac{1}{4}\times\frac{4}{5}$
4. $\frac{1}{2}\times\frac{1}{3}$
5. $\frac{5}{6}\times\frac{3}{4}$
6. $\frac{1}{4}\times\frac{1}{2}$
7. $\frac{2}{3}\times\frac{3}{4}$
8. $\frac{3}{5}\times\frac{5}{6}$
9. $2\frac{2}{3}\times\frac{3}{8}$
10. $\frac{3}{4}\times 4\frac{1}{2}$
11. $5\frac{1}{4}\times 5\frac{7}{8}$
12. $4\frac{3}{4}\times 6\frac{4}{5}$
13. $\begin{array}{r}20\\ \underline{5\frac{3}{4}}\end{array}$
14. $\begin{array}{r}36\\ \underline{7\frac{1}{2}}\end{array}$
15. $\begin{array}{r}42\\ \underline{4\frac{5}{6}}\end{array}$

Divide:

1. $\frac{7}{8}\div\frac{1}{8}$
2. $\frac{3}{4}\div\frac{5}{8}$
3. $\frac{2}{3}\div\frac{1}{2}$
4. $\frac{4}{5}\div\frac{2}{3}$
5. $4\frac{2}{3}\div\frac{5}{6}$
6. $\frac{3}{4}\div 2\frac{5}{8}$
7. $3\frac{5}{6}\div\frac{3}{5}$
8. $\frac{5}{12}\div 3\frac{3}{4}$
9. $8\frac{1}{3}\div 100$
10. $8\div 1\frac{1}{5}$
11. $5\frac{1}{4}\div 2\frac{1}{2}$
12. $10\frac{1}{2}\div 2\frac{1}{3}$

Many sixth grade pupils can do all these examples within the time limits. How many can you do?

At the end of the given time for each test, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

FIVE MINUTE TEST IN ADDITION AFTER COPYING

1. \$895.74	\$ 50.08	\$ 29.74	\$ 51.97
918.56	138.60	704.39	67.13
707.32	98.25	95.66	617.71
3.79	21.54	267.59	12.10
55.69	32.50	89.85	345.99

2. \$6984.98	\$ 9.40	\$804.20	\$360.20
2541.32	65.50	47.37	49.06
89.68	115.52	39.04	161.43
1508.63	321.84	12.80	59.50
54.09	631.98	8.42	72.17
			163.57

FIVE MINUTE TEST IN SUBTRACTION AFTER COPYING

1. \$1593.82 927.09	4. \$1619.18 870.24	7. \$5738.65 4487.70	10. \$17429.50 8478.80
2. \$15037.46 6181.96	5. \$13029.50 3645.58	8. \$1342.00 512.03	11. \$10816.65 4145.01
3. \$11723.00 3008.59	6. \$14471.49 7107.60	9. \$12139.16 4463.03	12. \$16267.21 8242.79

Many sixth grade pupils can do all these examples within the time limits. How many can you do?

At the end of the given time for each test, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

TWELVE MINUTE TEST IN DIVISION AFTER COPYING

1. $29\overline{)2494}$	2. $48\overline{)4540}$	3. $69\overline{)6003}$	4. $89\overline{)8279}$
5. $25\overline{)\$24.50}$	6. $46\overline{)\$34.05}$	7. $65\overline{)\$44.86}$	8. $84\overline{)\$61.15}$
9. $23\overline{)\$20.01}$	10. $37\overline{)\$34.44}$	11. $63\overline{)\$53.55}$	12. $87\overline{)\$61.15}$

TWELVE MINUTE TEST IN MULTIPLICATION AFTER COPYING

1. $\begin{array}{r}6804\\ \underline{89}\end{array}$	2. $\begin{array}{r}9486\\ \underline{67}\end{array}$	3. $\begin{array}{r}6908\\ \underline{54}\end{array}$	4. $\begin{array}{r}5321\\ \underline{68}\end{array}$
5. $\begin{array}{r}9312\\ \underline{209}\end{array}$	6. $\begin{array}{r}1235\\ \underline{57}\end{array}$	7. $\begin{array}{r}7321\\ \underline{43}\end{array}$	8. $\begin{array}{r}8753\\ \underline{92}\end{array}$
9. $\begin{array}{r}9607\\ \underline{108}\end{array}$	10. $\begin{array}{r}945\\ \underline{24}\end{array}$	11. $\begin{array}{r}870\\ \underline{37}\end{array}$	12. $\begin{array}{r}874\\ \underline{615}\end{array}$
13. $\begin{array}{r}9654\\ \underline{302}\end{array}$	14. $\begin{array}{r}832\\ \underline{108}\end{array}$	15. $\begin{array}{r}806\\ \underline{80}\end{array}$	16. $\begin{array}{r}510\\ \underline{216}\end{array}$

BILLS

When Mrs. Lee goes to market to make purchases and pays for them at the time, the clerk gives her a sales slip on which is written a list of the articles bought and the price of each article. No other bill is needed.

Sometimes Mrs. Lee has her purchases "charged," that is, she does not pay at the time of purchase. The grocer allows her to do this because he knows she pays her bills promptly, which means that her credit is good. When her purchases are charged, the clerk makes two copies of the sales slip. One copy is given to Mrs. Lee and the other is kept at the store. In this way the grocer keeps account of what Mrs. Lee owes him.

Mrs. Lee checks each sales slip to be sure she has been charged the right amount, and saves the slips to compare with the monthly bill.

On the first of each month, the grocer sends Mrs. Lee a record of what she owes. This record is called a *bill* or *statement.*

DUNN BROTHERS MARKET ALBANY, N. Y. Jan. 2, 19 27

SOLD TO Mrs R. T. Lee
857 Allen St.
Albany, N. Y.

PAID
Jan. 3
DUNN BROS. MARKET
per J. F.

Dec	2	2 loaves bread @ 12¢		24
	6	2 lb butter @ 58¢	1	16
	10	1½ lb. cheese @ 38¢		57
	27	1 package crackers		18
			2	15

Mrs. Lee compares her bill with the sales slips given her when she made the purchases and finds that it is correct. Then she takes the bill to the store and pays it. When a bill is paid, the person who receives the money must receipt it, that is, write on it, "Received Payment" or "Paid" with the date, the name of the store and his name or initials. The receipted bill is then returned to the customer to keep as a record that it has been paid.

How is Mrs. Lee's bill receipted? Why should you keep a bill that has been receipted? Ask your mother to let you see some of her receipted bills.

Bills are not always made in the same form, but to be correct, they must show the date, the place, the buyer, the seller, the articles purchased with the price of each, and the amount of the bill.

How is this bill different from Mrs. Lee's bill?

Madison, Wis., June 1, 1927

Mrs. K. P. Sneider
546 Ash St.
Madison, Wis.

BOUGHT OF WEBBER & HEWITT

May	3	Bag of flour	1	70		
		2 lb steak @ 50¢	1	00	2	70
May	17	5 lb sugar @ 6¢		30		30
		RECEIVED PAYMENT June 7 WEBBER & HEWITT By J. J.			3	00

With your ruler make some blank bill forms. Make receipted bills for these purchases. Use your own name as buyer and the name of some store in your town as the dealer.

1.

2 sweaters	@	$4.75
4 tennis balls	@	.65
2 baseballs	@	1.25
4 bats	@	.65

2.

9 baseball suits	@	6.25
2 gloves	@	2.25
6 balls	@	1.25
3 bats	@	.75

3.

4 games	@	.85
2 brushes	@	.37
$2\frac{1}{2}$ doz. pencils	@	.60
2 paint boxes	@	.49

4.

$3\frac{1}{2}$ lb. bacon	@	.32
4 doz. eggs	@	.38
$2\frac{1}{2}$ lb. lard	@	.12
12 lb. sugar	@	$.06\frac{1}{2}$

5.

$5\frac{1}{2}$ yd. cloth	@	$.60
12 yd. braid	@	$.07\frac{1}{2}$
$1\frac{1}{2}$ doz. hooks	@	.16
$8\frac{1}{2}$ yd. ribbon	@	.24

6.

1 suit	@	18.75
4 pairs of socks	@	$.37\frac{1}{2}$
1 belt	@	.75
4 shirts	@	1.50

7.

$\frac{1}{2}$ lb. tea	@	.70
$2\frac{1}{2}$ lb. cheese	@	.32
$1\frac{1}{2}$ lb. cake	@	.35
10 lb. sugar	@	$.06\frac{1}{2}$

8.

$2\frac{1}{2}$ doz. eggs	@	.38
$\frac{1}{2}$ bu. apples	@	1.00
$3\frac{1}{2}$ lb. butter	@	.52
$\frac{1}{2}$ gal. of oil	@	.16

9. Make out a real or imaginary grocery bill for your family for a week. Find the price of different articles at your grocery store.

10. Find the price of milk and cream and make a milk bill for your family for a week.

11. Storekeepers and dealers are not the only people who send bills. From whom might you receive bills for labor or for services?

RECEIPTS

Sometimes money is paid when no bill has been presented. You might buy a second-hand bicycle and wish to have a signed receipt showing that you had paid for it, or you might hire a man to spade your garden and wish to have his signed receipt of payment.

Here is the way to make this kind of a receipt.

> Worcester, Mass., May 2, 19 27
>
> **RECEIVED from** Robert Sanders
>
> Two and 40/100 **DOLLARS**
>
> **FOR** Four hours labor spading garden
>
> **$** 2.40 Mark White

A receipt of this kind should always contain the place, the date, the name of the one who pays the money, the amount paid and what it is paid for and the name signed by the one who receives the money.

Who received the money shown in this receipt? Who paid it?

Make out receipts for these payments. Supply names and dates:

1. A bicycle at $40.
2. A canoe at $75.
3. For mowing the lawn for 1 month, $6.
4. Subscription to Boy Scouts' magazine at $2.00.

STATEMENTS

Most stores send monthly bills or statements to their customers which show:

1. Charges for articles purchased, with the date and the amount of each purchase.

2. Credits for articles returned, and cash paid, with the date and the amount of each payment.

3. The amount owing each day, and the balance due or the amount that is owed at the end of the month.

MILLER SPORTING GOODS COMPANY

ALBANY, NEW YORK

July 1, 1927

SOLD TO Mrs. R. T. Lee,

857 N. Allen St.,

Albany, New York

June 1927	ITEMS	Charges	Credits	Last Amount in This Column Is Balance Due
8	1 tennis racket	12 00		
"	2 tennis balls @ 40¢	80		12 80
12	4 rolls films @ 25¢	1 00		13 80
15	Cash		12 00	1 80
18	2 tennis balls @ 40¢	80		
"	1 bathing suit	5 50		8 10
20	Returned 1 bathing suit		5 50	2 60

Paid
July 11, 1927
MILLER SPORTING GOODS COMPANY
Per D.K.E.

After Mrs. Lee has checked this statement to be sure that the charges and credits are correct, how can she know quickly if the balance due is correct?

She can do this by subtracting the sum of the credits from the sum of the charges. The difference is the balance due.

Which items on Mrs. Lee's statement are credits?

What was the balance due on June 12th? On June 15th? Why is the balance due less on June 15th?

With a ruler make a blank statement like Mrs. Lee's and fill it in with these charges and credits:

Mrs. Robert T. Allen, 72 Whitney St., Scranton, Pa., bought from Edw. W. Goddard & Co., 232 West St., Scranton, Pa., on Nov. 3rd, 2 pr. silk hose at $1.95 a pair; Nov. 10th, 1 wool scarf and cap at $4.50; Nov. 12th, 1 cook book at $2.50. On Nov. 15th she paid $5.00 on her account. On Nov. 17th, she took back the cook book, as it was damaged. The store gave her credit for it. On Nov. 27th, she bought 3 yards of silk at $2.25 a yard.

MAKING A FAMILY BUDGET

A plan for using an income is called a *budget*. A plan for the use of a family's income is called a *family budget*.

Mr. Lee earns $2,340 a year. How much does he earn each month? Each week?

The Lee family found they were spending nearly as much as Mr. Lee earned. At the end of each month, they had hardly any money left to put in the bank.

They decided that they would be more careful in spending their money if they made a budget.

This is how the Lees made their budget:

1. They divided Mr. Lee's income for the year, $2,340, by 12. He earned $195 each month.

2. They made a list of expenses that they had every month; rent, food, clothes, heat, light and supplies, and other expenses such as money for church, the movies and music lessons.

3. They made a plan showing how much they thought it would be necessary to spend for each purpose.

4. They added these amounts together and found that the total was $172.00. Then they subtracted this sum from $195. The difference between Mr. Lee's monthly income and their expenses they added to their list as savings.

Rent	$ 45.00
Food	54.00
Clothes	30.00
Heat, light and supplies	18.00
Other expenses	25.00
Savings	23.00
	$195.00

What expenses would be about the same every month in the year? Which ones would be larger in winter?

1. Suppose you have an allowance of $15 a month. Make a budget showing how you would spend it. Allow for savings and church as well as other expenses.

2. Suppose your club was giving a Christmas party for poor children and you had $10.00 in the treasury. You would have to plan very carefully to get everything you would need. Make a plan or budget for spending the money.

A CASH ACCOUNT

This is Mrs. Lee's family cash account for the month of July:

Rec'd.					Spent				
July	1	20 qt. cherries			July	1	Rent	45	00
		sold Mrs. Todd			"	3	Grocery bill	32	50
		@ 15¢	3	00	"	3	1 pr. shoes for Nan	4	50
					"	4	Church for month	8	00
	1	Mr Lee's			"	5	Joe's July allowance	2	00
		June salary	195	00	"	5	Nan's July allowance	2	00
					"	10	Telephone bill	3	50
					"	12	Paper hanger's bill	8	80
					"	15	Tickets to movies	1	00
					"	17	Milk bill for June	7	75
					"	21	Ice bill	3	60
					"	23	Light and gas bill	5	00
					"	24	Carfare to the picnic	1	52
					"	30	Gow's Department		
							Store bill	17	98
								143	15
							Balance	54	85
			198	00				198	00

The money which she received during the month is shown on the left-hand side and the money paid out during the month on the right-hand side. At the end of the month, by adding each side and subtracting the smaller sum from the larger, she finds the *balance.*

The left-hand or receipt side of a cash account cannot be less than the other side. Can you tell why? How much more did Mrs. Lee receive than she paid out?

Compare Mrs. Lee's cash account for one month with the Lee's budget for one month, page 269.

1. Which of these expenses would come under rent; food; clothes; heat, light and supplies; other expenses?

2. Did Mrs. Lee spend more or less than the budget allowed on each item. How much did she save?

Draw **lines for a cash account and fill in with** these receipts and expenses:

1. Harry Jones received on February 12 his allowance of \$1.00; on Feb. 13 he spent \$.15 for the movies; on Feb. 14 he earned \$.25; Feb. 15 he spent \$.25 for lunch; Feb. 16 he spent \$.12 for trolley fare; Feb. 17 he earned \$.50; Feb. 17 he spent \$.25 for a ticket to the school ball game. What balance did Harry have left to put in the bank?

2. Keep an imaginary cash account for yourself. Suppose that you have an allowance of \$5.00 a month to buy school supplies, personal supplies and other things.

A BOY IN BUSINESS

Walter used some of his father's land for a garden. All his expenses were for seed. He kept a cash account of his receipts and expenses. Here they are:

	Cost of Seed	Size of Crop	Selling Price
Peas	$4\frac{1}{2}$ lb. at 35¢ a lb.	$4\frac{1}{2}$ bushels	@ 35¢ a peck
Corn	8 lb. at $7\frac{1}{2}$¢ a lb.	35 dozen ears	@ 28¢ a dozen
Beets	$2\frac{1}{2}$ oz. at 35¢ an oz.	108 bunches	@ 5¢ a bunch
Beans	$2\frac{1}{2}$ lb. at 30¢ a lb.	48 quarts	@ 12¢ a quart

How much did Walter make on each kind of vegetable? How much did he make on his garden?

STARTING A BANK ACCOUNT

The safest place to keep money is in the bank. Why?

Tom Smith had $10.50 given him on his birthday. With this money he started a *savings account* at the bank, that is, he left the money with the bank to be saved for him.

BALTIMORE TRUST COMPANY
BALTIMORE, MARYLAND

DATE October 10, 1927

DEPOSITED BY Tom Smith

BILLS	10	00
COINS		50
CHECKS		
TOTAL	10	50

The money that is left in the care of the bank is called a *deposit.*

The person who leaves the money is a *depositor.*

When Tom opened his savings account he filled out this deposit slip.

Tom had $10.00 in bills and 50 cents in coins. See how he listed them.

He took the deposit slip and his money to a window marked "Deposits." The man at this window, called a "teller," took his money and gave him a small bank book filled out with Tom's name and the number of his account. In the book was written, "Oct. 10, $10.50." The deposit slip is the bank's record of the amount of money Tom deposits, and the amount written in the bank book is Tom's record.

With a pencil and ruler make 3 copies of this deposit slip. Fill them in with imaginary deposits.

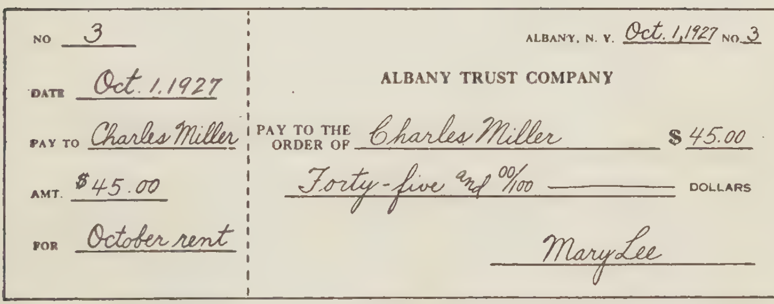
CHECKS

There are two kinds of bank accounts—one is called a *savings account* and the other, a *checking account.*

When we expect to draw sums of money from the bank to use or to pay our bills, we usually open a checking account. The teller then gives us a check book as well as a bank book. When we wish to draw out some of the money we have deposited, we fill out one of the checks and present it at the bank. The teller will give us the sum of money that is written on the check.

A check is a written order on a bank for the payment of money.

The Stub **The Check**

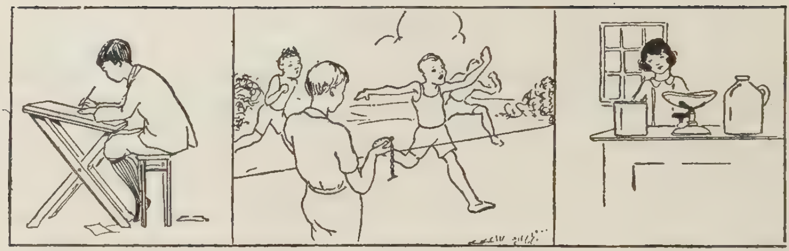


The record of each check is kept on a form called a stub. When we tear the check from the check book, we leave the stub.

Make two blank copies of this check and stub. Fill them out as they were written to make these payments:

1. Seventy-five dollars, which James H. Holmes pays to Charles Brown for rent on January 1st, 1927.

2. Sixty dollars, which Mary Robinson pays to Frank Clark for lumber, on Dec. 15, 1927.



DENOMINATE NUMBERS

In school, in work and in play we use and talk about the size of things.

To find the size of anything, we must measure it. The length of a broad jump is measured in feet and inches. Your weight is measured in pounds. Gasoline is measured in gallons.

The sizes of things are expressed in units of measure. When we measure anything we find how many units of measure there are in it.

The exact sizes of the different units of measure are fixed by law. In the Bureau of Standards at Washington, the government keeps the exact standards for the United States, such as the standard yard, which is exactly a yard long, and the standard pound, which is exactly one pound.

Numbers which tell units of measure are called *denominate numbers.* 12 feet, 6 bushels, and 40 seconds are denominate numbers.

Numbers which tell more than one unit of measure are called *compound numbers.* 2 feet 8 inches; 6 pounds 8 ounces; 1 hour 20 minutes are compound numbers.

When units of measure are changed from one form to another, without changing the value, such as 3 feet to 36 inches, the process is called *reduction of denominate numbers.*

MEASURES OF LENGTH

12	inches (in.)	= 1 foot (ft.)
3	feet	= 1 yard (yd.)
$5\frac{1}{2}$	yd. or $16\frac{1}{2}$ ft.	= 1 rod (rd.)
320	rods or 5280 ft.	= 1 mile (mi.)

Another abbreviation used for feet is (′), and for inches (″). We may write 4 ft. 9 in., 4′ 9″.

The sizes of things measured by units of length are sometimes called the *dimensions.* The length and the width of the doorway are its dimensions; and the height, the width and length of a box are its dimensions.

What are the dimensions of your school room? Of the top of your desk? Of your largest book?

PROBLEMS IN REDUCTION

1. 6 ft. = ? in. 2. 3 yd. = ? ft. 3. 2 rd. = ? yd.

4. 2 mi. = ? rd. 5. $6\frac{3}{4}$ ft. = ? in. 6. 3 mi. = ? ft.

7. How many inches long is a fish pole 8 feet long?

8. A boy jumped $5\frac{1}{2}$ ft. How many inches did he jump?

9. How many inches tall is a boy who is $4\frac{1}{2}$ ft. tall?

10. A man's step is $2\frac{1}{2}$ ft. long. How many inches are there in 8 steps?

11. John lives 800 rods from the school. How many miles is that?

12. Ted had 175 ft. of kite string. How many yards long was the string?

REDUCTION OF COMPOUND NUMBERS

The tallest boy in John's class measures 5 ft. 7 in. How many inches tall is he?

5 ft. 7 in. = ? in. 5 ft. = 5 × 12 in. = 60 in. 60 in. + 7 in. = 67 in. The boy is 67 inches tall	As 12 in. = 1 ft., to find the number of inches in 5 ft. multiply 12 in. by 5. Add to the product the 7 in. of the 5 ft. 7 in.

Change:

1. 3 ft. 9 in. = ? in.
2. 4 yd. 2 ft. = ? ft.
3. 2 rd. 4 yd. = ? yd.
4. 2 mi. 8 rd. = ? rd.
5. 4 rd. 7 yd. = ? yd.
6. 8 ft. 6 in. = ? in.

John is 69 inches tall. How many feet tall is he?

69 in. = ? ft. 69 in. ÷ 12 in. = 5 ft. and 9 in. $\frac{3}{4}$ ft. John is 5 ft. 9 in. or $5\frac{3}{4}$ ft. tall.	As 12 in. = 1 ft., to find the number of feet in 69 in. divide 69 in. by 12 in.

Change:

1. 152 ft. to yards.
2. 80 in. to feet.
3. 33 ft. to rods.
4. 54 in. to feet and inches.
5. 98 in. to feet and inches.
6. 160 inches to feet.

ADDING AND SUBTRACTING COMPOUND NUMBERS

Ned needs two pieces of wire for his radio, one piece 4′ 8″ long and one 2′ 6″ long. How much does he need in all? How much longer is one piece than the other?

How to Add or Subtract Compound Numbers

4 ft. 8 in. + 2 ft. 6 in. =

4 ft. 8 in. = $4\frac{2}{3}$ ft. or 56 in.

2 ft. 6 in. = $2\frac{1}{2}$ ft. or 30 in.

Before adding or subtracting compound numbers change them to the same unit of measure.

$$\begin{array}{r} 4\frac{2}{3} \text{ ft.} \\ \underline{2\frac{1}{2} \text{ ft.}} \\ 6\frac{7}{6} \text{ ft.} = 7\frac{1}{6} \text{ ft.} \end{array} \quad \textit{or} \quad \begin{array}{r} 56 \text{ in.} \\ \underline{30 \text{ in.}} \\ 86 \text{ in.} = 7 \text{ ft. } 2 \text{ in.} \end{array}$$

When the units of measure are alike, add.

Ned needs $7\frac{1}{6}$ ft. or 7′ 2″.

4 ft. 8 in. — 2 ft. 6 in. =

$$\begin{array}{r} 4\frac{2}{3} \text{ ft.} \\ \underline{2\frac{1}{2} \text{ ft.}} \\ 2\frac{1}{6} \text{ ft.} \end{array} \quad \textit{or} \quad \begin{array}{r} 56 \text{ in.} \\ \underline{30 \text{ in.}} \\ 26 \text{ in.} = 2 \text{ ft. } 2 \text{ in.} \end{array}$$

When the units of measure are alike, subtract.

One piece is $2\frac{1}{6}$ ft. or 2′ 2″ longer than the other.

Add:

1. 4 ft. 3 in. + 2 ft. 3 in.
2. $6\frac{1}{2}$ ft. + 4 ft. 9 in.
3. 2′ 3″ + 17′ 5 ″
4. $6\frac{1}{2}$ yd. + 2 yd. 27 in.

Subtract:

1. $6\frac{2}{3}$ yd. — 3 ft. 7 in.
2. $2\frac{5}{6}$ ft. — 2 ft. 9 in.
3. 6′ 10 ″ — 4′ 3″
4. 1 yd. 27 in. — $\frac{2}{3}$ yd.

USING THE MEASURE OF LENGTH

1. My aster bed is $6\frac{1}{2}$ feet long and $3\frac{3}{4}$ feet wide. What are its dimensions in inches?

2. Gertrude needs 64 inches of braid for the edge of her dog's blanket. How many yards must she buy?

3. There is a grove 80 rods from our house. What part of a mile is that? What is the distance in feet?

4. An airplane flew to a height of 17,000 feet. How many miles was that?

5. Our football team had to make 10 yd. 1 ft. for a touchdown. On the next play the ball was advanced 5 yd. 2 ft. How far was the ball from the goal line?

6. How much shorter is a fish pole that is 7 ft. 9 in. long than one that is 9 ft. 2 in. long?

7. Donald caught a fish 2′ 3″ long. Bill's longest fish was 1′ 7″. How much longer was Donald's fish?

8. The park swimming pool is 2′ 6″ deep at one end and 6′ 11″ deep at the other end. What is the difference in the depth?

9. Grandfather put up two swings for us at the farm. For one he used a rope 30′ 6″ long and for the other he used a rope 45′ 9″ long. How much rope did he use?

10. Our cornfield is 20 rods long and 15 rods wide. How far is it around the field in rods; in yards; in feet?

11. For my new dress I need 2 yd. 27 in. of pink organdie and 1 yd. 18 in. of white organdie. How much more pink than white must I buy? How many yards of organdie must I buy in all?

THE MEASURES OF WEIGHT

16 ounces (oz.)	=	1 pound (lb.)
100 pounds	=	1 hundredweight (cwt.)
2000 pounds	=	1 ton (T.)

Change:

1. 3 lb. 8 oz. to ounces.
2. 2 cwt. 25 lb. to pounds.
3. 1 ton 500 lb. to pounds.
4. .75 cwt. to pounds.
5. 24 oz. to pounds.
6. 5000 lb. to tons.
7. 2 lb. 4 oz. to ounces.
8. 3 cwt. 75 lb. to pounds.

MULTIPLICATION OF COMPOUND NUMBERS

Find the weight of 21 cans of coffee each weighing 2 lb. 4 oz.

How to Multiply Compound Numbers

21×2 lb. 4 oz. =

2 lb. 4 oz. = $2\frac{1}{4}$ lb. or 36 oz.

$21 \times 2\frac{1}{4}$ lb. = $47\frac{1}{4}$ lb.

Before multiplying, change the compound number to a single unit of measure.

21×36 oz. = 756 oz. = 47 lb. 4 oz.

Then multiply.

The weight is $47\frac{1}{4}$ lb. or 47 lb. 4 oz.

Give the answers:

41×2 lb. 3 oz.	6×4 cwt. 17 lb.	65×3 cwt. 6 oz.
7×2 T. 55 lb.	25×11 lb. 13 oz.	16×1 T. 300 lb.

LIQUID MEASURE

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)

Give the missing numbers:

8 qt. 1 pt. = ? pt.	29 qt. = ? gal. ? qt.
$4\frac{1}{2}$ gal. = ? qt.	17 pt. = ? gal. ? pt.
17 pt. = ? qt.	14 qt. 1 pt. = ? pt.
1.5 qt. = ? pt.	3.5 gal. = ? qt.

PROBLEMS

1. If maple syrup by the gallon costs $2.50, how much more must be paid for a gallon sold in quart bottles at 75¢ each?

2. The school cafeteria pays 14¢ a quart for milk and sells it in half pint bottles at 5¢ a bottle. What is the gain on one quart? On 18 quarts?

3. For a party, 2 qt. 1 pt. of cocoa were made in one kettle and a gallon of cocoa in another kettle. How many pints of cocoa were made in all?

4. A milkman delivers 6 gal. 2 qt. of milk at a soda fountain every day. How much does he deliver in 6 days?

5. Five gallons of lemonade were made for a large picnic. If 16 qt. 1 pt. were used, how much was left?

6. Mr. Ross drives the distance between his summer home and his office 12 times each week. He uses 1 gal. 1 qt. of gasoline for each trip. How much gasoline does he use for 12 trips?

DRY MEASURE

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks or 32 quarts	= 1 bushel (bu.)

Change:

1. 8 qt. 1 pt. to pints.
2. 3 pk. 2 qt. to quarts.
3. 2 bu. 4 qt. to quarts.
4. 28 qt. to pk. and qt.
5. 75 qt. to bu. and qt.
6. $\frac{3}{4}$ pk. to pints.
7. $\frac{2}{3}$ bushel to quarts.
8. $\frac{7}{8}$ bushel to pecks.
9. $2\frac{3}{4}$ bu. to quarts.
10. $3\frac{3}{8}$ pk. to pints.

Thirteen children of the sixth grade class went nutting and put all the nuts in a large bag. They measured them and found they had 3 pecks and 2 quarts. They divided the nuts equally. What was each one's share?

How to Divide Compound Numbers

3 pk. 2 qt. ÷ 13 =

3 pk. 2 qt. = $3\frac{1}{4}$ pk. or 26 qt.

$3\frac{1}{4}$ pk. ÷ 13 = $\frac{1}{4}$ pk.

26 qt. ÷ 13 = 2 qt.

Before dividing compound numbers, change them to a single unit of measure. Divide.

Each child's share was $\frac{1}{4}$ peck or 2 quarts.

Divide:

1 qt. 1 pt. by 3

2 pk. 2 qt. by 9

2 bu. 3 qt. by 5

25 qt. 1 pt. by 17

Divide:

1. 3 bu. 3 qt. by 3.	$\frac{3}{4}$ bu. by 2.
2. 7 pk. 4 qt. by 5.	$\frac{5}{8}$ pk. by 5.
3. 18 qt. 2 pt. by 2.	$\frac{3}{8}$ bu. by 4.
4. 1 bu. 3 qt. by 7.	$2\frac{1}{2}$ pk. by 10.

PROBLEMS

1. Lucy picked 4 bu. 2 pk. of grapes last fall. She put them in 16 baskets for her father to take to market. How much did each basket hold?

2. A market gardener picked 13 bu. 12 qt. of tomatoes. They were sold in 107 baskets. How much did each basket hold?

3. A farmer went to market with 10 bu. 2 pk. of peaches. He sold them all to 12 customers. What was the average sale?

4. David sold 1 bu. 3 qt. of strawberries for 35¢ a quart, and 2 bu. 1 pk. of strawberries at 25¢ a quart. How much money did he receive?

5. Ted had 3 cherry trees. From the first tree, he picked 2 bu. 1 pk.; from the second, 1 bu. 3 pk. 2 qt.; from the third, 2 bu. 3 pk. How many pecks of cherries did he pick in all?

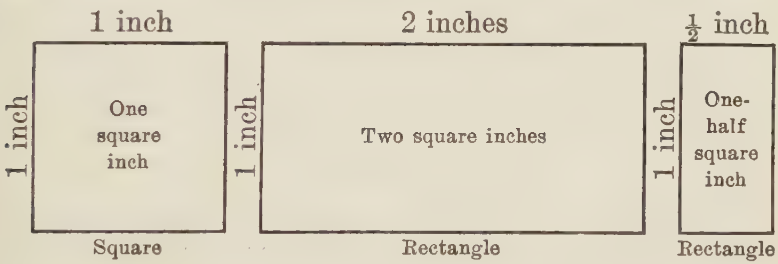
6. Howard had two apple trees. One yielded 1 bu. 4 qt. and the other 1 bu. 2 pk. What was the difference in the yield of the two trees?

7. A seed dealer put 1 bu. 4 qt. of grass seed in 24 packages. How many pints did he put in each package?

SURFACE MEASURES

144	square inches (sq. in.)	= 1 square foot (sq. ft.)
9	square feet	= 1 square yard (sq. yd.)
$30\frac{1}{4}$	square yards	= 1 square rod (sq. rd.)
160	square rods	= 1 acre (A.)
640	acres	= 1 square mile (sq. mi.)

The distance around a square or a rectangle is called its *perimeter.*



THINGS WE HAVE LEARNED ABOUT SURFACE MEASURES

A figure with 4 sides and 4 square corners is a rectangle.

The length and the width of a rectangle are called its dimensions.

A rectangle with both dimensions the same is a square.

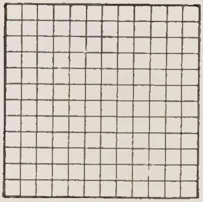
A square with both dimensions 1 inch is a square inch.

A square with both dimensions 1 yard is a square yard.

A square with both dimensions 1 mile is a square mile.

Change:

1. 2 sq. ft. to sq. in.
2. 27 sq. ft. to sq. yd.
3. 2 sq. mi. to acres.
4. 432 sq. in. to sq. ft.
5. $4\frac{1}{2}$ sq. ft. to sq. in.
6. $1\frac{1}{2}$ acres to sq. rd.



Draw a square foot. Divide it into square inches. Count the square inches. How many are there?

Multiply the number of square inches in one row by the number of rows. What is this product?

Remember: When we find the area of a rectangle we find the number of units of surface measure it contains.

A short way to find the area of a rectangle is to multiply the length by the width. Before multiplying be sure to have the same unit of measure for both length and width.

PROBLEMS

1. Draw on the board a square with each dimension 3 ft. Divide it into square ft. How many sq. ft. are there? What is the difference in area between a 3 ft. square and 3 sq. ft.?

2. How many square feet are there in a flower bed 24 ft. long and 6 ft wide?

3. How many square inches are there in a board 10 ft. long and 1 ft. wide?

4. How much will Mary have to pay for the wire netting for a row of sweet peas 18 ft. long, if the netting is 4 ft. wide and costs $2\frac{1}{2}$¢ a square foot?

5. The dimensions of a farmer's hay field are 40 rods and 80 rods. How many acres are there in it?

6. Find in square yards the area of a room 18 ft. long and 9 ft. wide.

7. How much will it cost to clean a rug 9 ft. long and 12 ft. wide at 7¢ a square foot?

8. How many sq. in. are there in $\frac{7}{8}$ of a sq. ft.?

9. At $96 an acre what will be the cost of 120 sq. rd. of land?

10. Mrs. Wade is giving up part of her garden for a tennis court for the children. The garden is 40 yd. long and 30 yd. wide. The tennis court with some extra space for the back and sides will take 5,000 sq. ft. How many sq. ft. will Mrs. Wade have left for her garden?

BUYING BY THE DOZEN

12 units	= 1 dozen (doz.)
12 dozen	= 1 gross (gro.)

1. Name some things sold by the dozen and gross.

2. Find the cost of $12\frac{1}{2}$ dozen eggs at 48¢ a dozen.

3. One month, the hardware dealer sold $18\frac{1}{2}$ gross of screws at 8¢ a dozen. How much did he receive for the screws?

4. If a school buys 72 dozen pens in a year, how much would they cost at $1.25 a gross?

Find the gain from each purchase and sale:

	Articles	Quantity and Cost	Selling Price
1.	Collars	15 doz. at $1.08	2 for 25¢
2.	Pencils	36 gross at $1.75	2¢ each
3.	Hinges	6 dozen at $1.68	25¢ apiece
4.	Eggs	60 dozen at 42¢	49¢ a dozen

DRAWING TO SCALE

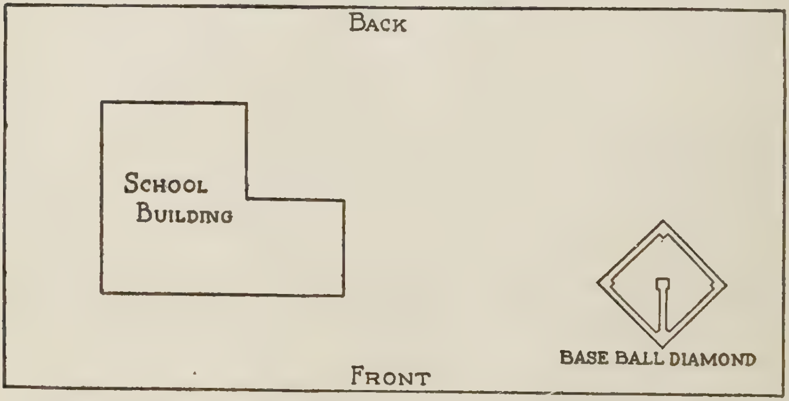
We have learned that when we draw short measures to stand for long ones, we are drawing to scale.

Maps in geography are drawn to scale. Sometimes an inch stands for a hundred miles; sometimes for one mile.

Plans of houses, gardens or building lots are drawn to scale.

The size of the scale used depends on the size of the area to be drawn and the size of the drawing to be made.

Here is a drawing of a school ground. In this plan $\frac{1}{2}'' = 100'$.



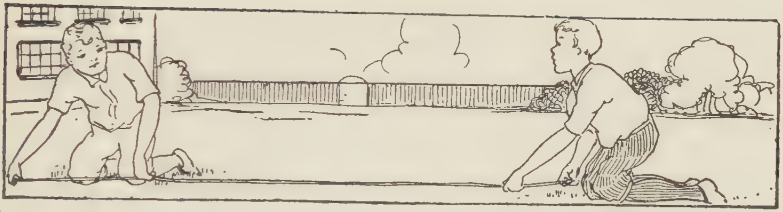
Use your ruler to help you answer these questions:

1. What are the dimensions of the school grounds?

2. What is the area in sq. ft.? In sq. yds.?

3. What is the length of the school building? What is its greatest width? How far is it from the building to the front line?

4. How far is it from the home plate on the ball diamond to the back line of the grounds?



1. Draw on your paper a line 3 inches long to stand for 1 yard. What scale did you use for 1 foot?

2. A tree is 48 feet high. Using the scale 1 in. = 8 ft. draw on the blackboard a line to stand for the tree. How long is your line?

3. Draw to the scale $1'' = 4'$ the plan of a room that is 12 feet by 18 feet.

4. Mr. Wallace is building a house that is 32 feet by 40 feet. Show how a small plan would look drawn to a scale of $1'' = 8'$.

5. The Woolworth Building in New York City is nearly 800 feet high. On the blackboard represent this height by a vertical line using the scale $1'' = 25'$. Show by another vertical line drawn to the same scale a boy 5 feet tall, standing by the side of the building.

6. Draw a map of your state. Draw a map of your county. Below each write the scale used.

7. Look up in your geography the maps of North America; of the United States; of your own state. What scales are used? Why are different scales used?

8. Find the dimensions of a baseball diamond. Make a drawing of a diamond using a scale of $1'' = 30'$. What is its real area? Its perimeter?

MEASURES OF TIME

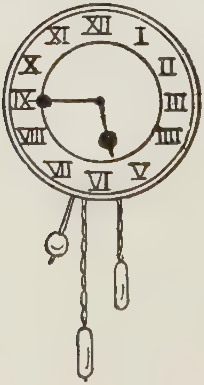
60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
52 weeks or 365 days	= 1 year (yr.)
or 366 days	= 1 leap year
12 months (mo.)	= 1 year
100 years	= 1 century

A. M. means before noon. M. means noon. P. M. means after noon.

If the number of the year can be divided by 4, it is a leap year, unless the number ends in two zeros. If the number ends in two zeros, it is a leap year only when it can be divided by 400.

Change:

1. 49 days to weeks
2. 30 months to years
3. 72 hours to days
4. $21\frac{1}{2}$ years to months
5. $1\frac{1}{4}$ hr. to minutes
6. 1 hr. 45 min. to minutes
7. 90 seconds to minutes
8. $2\frac{1}{2}$ days to hours



How long is it from 8:30 A. M. to 5:45 P. M.?

From	8:30 to	9:00 =	$\frac{1}{2}$	hr.
From	9:00 to	12:00 =	3	hr.
From	12:00 to	5:00 =	5	hr.
From	5:00 to	5:45 =	$\frac{3}{4}$	hr.
			$9\frac{1}{4}$	hr.

It is $9\frac{1}{4}$ hrs. from 8:30 A. M. to 5:45 P. M.

PROBLEMS

1. How long is it from 9 A. M. to 11:30 A. M.?

2. How many minutes are there in a noon recess that starts at 12 o'clock and ends at 1:15 P. M.?

3. If James is to take the 11:30 A. M. train and it is now 8:45 A. M., how long is it before the train starts?

4. If the Empire State Express leaves New York City at 8:30 A. M. and arrives in Albany at 11:32 A. M., how long does the trip take?

5. Ted gets up at 7 A. M. and goes to bed at 8:45 P. M. Find the time between his getting up and going to bed.

6. The gates at a railroad crossing are operated from 6:30 A. M. to 11:15 P. M. For how many of the 24 hours is the crossing guarded?

7. George works in a grocery store every afternoon after school from 4:30 P. M. to 6 o'clock, and for 8 hours on Saturday. If he is paid 25 cents an hour how much does he earn in a week?

8. At 75 cents an hour how much will a man earn in 24 working days, if he works every day from 8 A. M. to 4:30 P. M., with one-half hour out for lunch?

9. Owing to lack of room our school is divided into two groups. Our group is in school from 8 A. M. to 12:30 P. M. The session for the other group begins at 12:30 P. M. In order that it may have as long a session as the first group, when should this session end?

10. Find out at what time the sun rose today and when it will set. Find the time from sunrise to sunset.

MEASURES OF TIME

How long was it from July 4, 1776 to Dec. 31, 1778? To Feb. 2, 1779?

Yr.	Mo.	Da.
1778	12	31
1776	7	4
2	5	27

Dec. 31, 1778 is the thirty-first day of the twelfth month of the year 1778. July 4, 1776 is the fourth day of the seventh month of the year 1776.

Subtract 4 days from 31 days; 7 months from 12 months; and 1776 from 1778.

It was 2 yr. 5 mo. and 27 da. from July 4, 1776, to Dec. 31, 1778.

Yr.	Mo.	Da.
1779	2	2
1776	7	4
2	6	28

When the days or months in the minuend are less than in the subtrahend, borrow one unit from the next larger unit of time at the left. Call a month 30 days.

30 da. + 2 da. = 32 da. 32 da. — 4 da. = 28 da.
12 mo. + 1 mo. = 13 mo. 13 mo. — 7 mo. = 6 mo.
1778 yr. — 1776 yr. = 2 yr.

From July 4, 1776 to Feb. 2, 1779 was 2 yr. 6 mo. and 28 da.

1. The United States was at war with Germany from April 6, 1917, until November 11, 1918. How long was that?

2. George Washington was born February 22, 1732. What was his age when he died, December 14, 1799?

3. Robert E. Lee was born Jan. 19, 1807. He died Oct. 12, 1870. How old was he when he died?

4. Subtract the date of your birth from the date today. Exactly how old are you?

CUBIC MEASURE

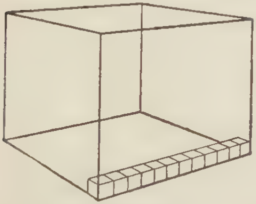
We have learned how to measure length with inches and feet and to measure surface with square inches and square feet.

A line has one dimension. What is it called? A surface has two dimensions. What are they called?

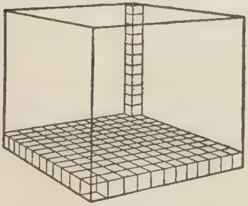
Solids have three dimensions. Their dimensions are length, width, and height. Sometimes the third dimension is called depth, or thickness, instead of height.

Solids whose surfaces, or faces, are rectangles are called *rectangular solids.* A brick is a rectangular solid.

A solid, all of whose faces are equal squares, is called a *cube.* When each face is one inch square the cube is a cubic inch. Its dimensions are 1 inch long, 1 inch wide and 1 inch high, or $1'' \times 1'' \times 1''$.



1. Look at the first drawing. It shows 12 cubes placed in a row. If each of these cubes were a one-inch cube, how many cubic inches would there be in the 12 blocks?



2. The second drawing represents a box that is a cubic foot. Its dimensions are $1' \times 1' \times 1'$ or $12'' \times 12'' \times 12''$. Twelve rows of one-inch cubes with 12 cubes in each row are shown as a bottom layer. How many cubic inches is that?

3. If we placed 12 such layers of cubes in the box we would have 12 times 144 cubes. How many cubic inches would this make? When we find the number of cubic inches or cubic feet in a solid we find its *volume.*

We can find the volume of a rectangular solid by first finding the number of cubes in one layer, and then multiplying that number by the number of layers.

1728 cubic inches (cu. in.)	= 1 cubic foot (cu. ft.)
27 cubic feet	= 1 cubic yard (cu. yd.)

A short way to find the volume of a rectangular solid is to multiply the length by the width and then multiply this product by the height. Before multiplying be sure that you have the same unit of length for all three dimensions.

How many one-inch cubes can be placed in boxes of the following dimensions?

1. 12 in. long, 12 in. wide, and 9 in. deep.
2. 12 in. long, 12 in. wide, and 12 in. deep.
3. 6 in. long, 6 in. wide, and 4 in. deep.
4. 10 in. long, 8 in. wide, and 6 in. deep.
5. 12 in. long, 4 in. wide, and 8 in. deep.

1. How many one-inch cubes will fill a box 12 inches long, 4 inches wide and 6 inches deep?

2. How many cubic inches are there in a box 2 ft. long, 1 ft. wide and $\frac{1}{2}$ ft. deep?

3. A kindergarten pupil was given a box filled with one-inch cubes. The box was 12 inches long, 12 inches wide and 1 inch deep. How many one-inch cubes were in it?

4. How many cubic yards of gravel will a box hold if it is 4 ft. wide, 9 ft. long, and 3 ft. deep?

TEST

Find the volumes of cubes whose edges are as follows:

1.	3 in.;	4 in.;	3 ft.;	4 ft.;	9 in.
2.	5 ft.;	8 ft.;	6 yd.;	10 yd.;	15 yd.

3. Find the volume of a block of marble 4 ft. long, 2 ft. wide and 2 ft. high.

4. How many cubic inches are there in a lunch box 8 in. long, 4 in. wide and 3 in. high?

5. Find the volume in cubic yards of a school room 24 ft. long, 21 ft. wide and 12 ft. high.

6. How many cubic yards are there in a box that is 6 ft. long, $1\frac{1}{2}$ ft. wide and 3 ft. high?

7. How many cubic yards of crushed stone are there in a load 9 ft. long, 6 ft. wide and 3 ft. deep?

A PROBLEM TEST IN MEASURES

1. How much would $1\frac{3}{4}$ bushels of cherries cost at 16¢ a quart?

2. How many cubic feet of dirt will be needed to fill 4 window boxes each 2 ft. long, 8 in. wide and 6 in. deep?

3. How much will $9\frac{3}{4}$ yd. of ribbon cost at 9¢ a foot?

4. When lemons are selling at 4 for 15 cents, how many can Harry buy for 60 cents?

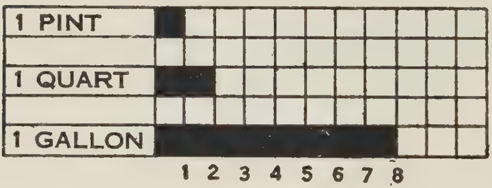
5. When corn is selling at $\$1.37\frac{1}{2}$ a bushel, what is the value of 2,000 bushels?

6. A flower bed is 18 yd. long and 8 ft. wide. How many square feet does it contain?

GRAPHS

A picture or diagram is often used to show how much larger or smaller one number is than some other numbers. A picture using lines drawn to scale to show the sizes of numbers is called a graph.

Study this graph. It pictures the difference in size of a pint, a quart and a gallon.



A graph in which heavy bars of different lengths are used is called a bar graph.

How many squares does the bar which stands for 1 gallon cover? How many squares does the bar which stands for 1 quart cover? 1 pint?

How many times 1 pint is 1 quart? How many times 1 quart is 1 gallon?

How many times 1 pint is 1 gallon? Does the graph show this? How?

Graphs are drawn on specially ruled paper. This may be bought at most book stores. It is called graph paper.

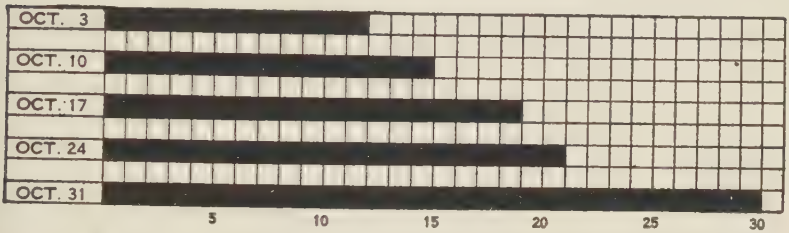
If you have no graph paper, use any ruled paper and make your own squares by drawing lines running up and down.

Make a graph picturing the sizes of a pint, a quart and a peck.

Make a graph picturing the sizes of a foot, a yard and a rod.

Make a graph showing 8, 9 and 10.

On October 3rd only 12 of the 30 pupils in the sixth grade had deposited money in the school savings bank. The teacher asked if others would not start accounts and said she would make a graph on the board to show each week how the number of accounts had grown. How many pupils had money in the school bank at the end of each of the five weeks?



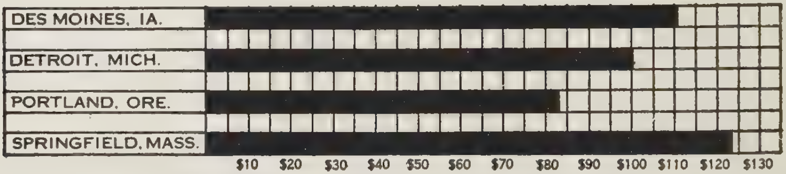
1. Mary is 10 years old; Donald is 8; Sarah is 12; Gertrude is 11. Let one square stand for a year and make a bar graph to show their ages.

2. Each school team in a city league played sixteen games of basket ball. The Lincoln School won 15 games, the Madison School won 8, the Roosevelt School won 5, and the Jefferson School won 4. Show this by a bar graph.

In the first graph that we studied, 1 square stands for 1 pint and in the second graph 1 square stands for 1 pupil. Sometimes the numbers that we want to picture are so large that 1 square has to stand for 5, 10, 100 or perhaps even 1,000,000.

3. Ned's club gave a movie for 4 evenings to raise money for the school gymnasium. The first evening 45 people came; the second, 40 people; the third, 50; the fourth, 65. Let one square stand for 5 people and make a bar graph to picture the number of people that came each evening.

Study this graph. It shows the average cost of educating each boy and girl in the public schools of four cities for a certain year:



Each square stands for $5. Would the bars have been longer or shorter if each square had represented $10?

Write the name of each city and after it, state as nearly as you can, its average cost of educating 1 pupil for a year.

Can you find the average cost per pupil in your school for last year?

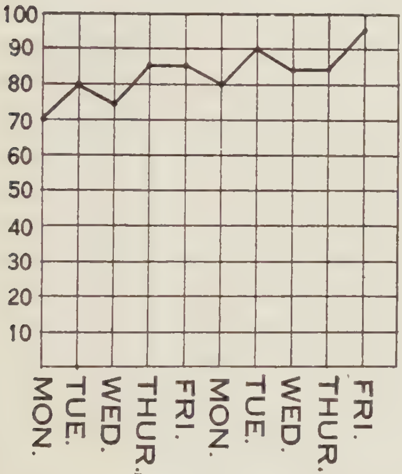
1. The U. S. Weather Bureau recently gave the record annual rainfall for all the weather stations. These are some of them: Mobile, Ala., 102 inches; Indianapolis, Ind., 41 inches; Helena, Mont., 12 inches; St. Louis, Mo., 37 inches, and Atlantic City, N. J., 41 inches. Show this by a bar graph. What value will you give to each square?

2. In 1924 the population of Pittsburgh, Pa., was about 626,000; Washington, D. C., about 489,000; New Orleans, La., about 410,000; Denver, Colo., about 272,000. Let one square stand for 100,000 population and make a bar graph showing the size of each of these cities.

3. In 1916 there were about 9,200,000 Bell telephones in use in the United States; in 1920, about 11,800,000; in 1924, about 15,000,000. Let one square stand for 1,000,000 and make a bar graph of these numbers.

When we want to picture how a record changes at different times, we use what is called a broken line graph.

1. Study the record of John's spelling marks for two weeks as shown on this graph.



The lines across stand for the spelling marks from 0 to 100.

Each line up and down stands for one day.

John's mark for each day is shown by a dot where the line for that day crosses the line that stands for his mark on that day.

After the dot for each day is placed, the dots are joined by lines.

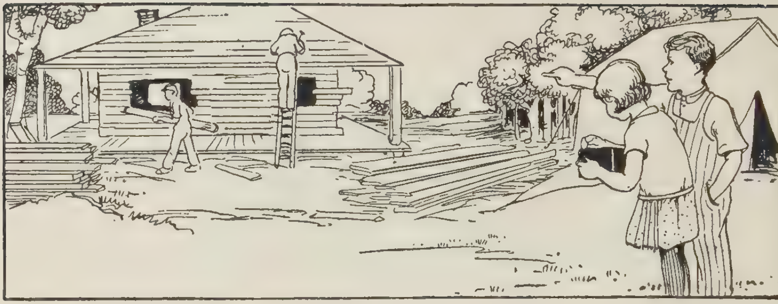
Tell from the graph John's mark for each day.

2. Constance had a record made of her height on each birthday. From the record that follows, draw a graph to show her increase in height from 6 to 13 years.

Age	Height	Age	Height	Age	Height	Age	Height
6	44 in.	8	49 in.	10	52 in.	12	56 in.
7	46 in.	9	51 in.	11	54 in.	13	58 in.

In making this graph place the birthdays at the bottom. At the side begin at 44 in. and number upward. Between which birthdays did Constance grow fastest? How does the graph show this? Between which birthdays did Constance grow slowest? How does this graph show this?

3. Keep a record of your standings in all your subjects for a week and draw graphs to show these records.



BUILDING A COTTAGE

Last summer the Todds built a bungalow at Emerald Lake. They lived in a tent while it was being built.

1. The lot on which the cottage was built was 132 ft. deep and 165 ft. wide. Give the dimensions of this lot in yards; in rods. How many feet is it around the lot? What is this distance called?

2. How many square feet are there in a lot 132 feet deep and 165 feet wide? How many square yards? Square rods? What part of an acre is that?

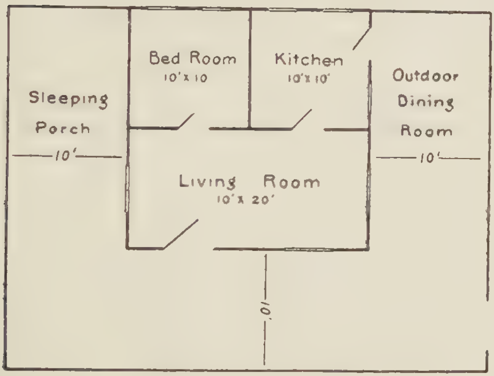
3. First of all the cellar was dug. The earth was taken away in a truck, $2\frac{1}{2}$ T. at a load. If 42 loads were taken away, how much earth was removed?

4. In building the cottage, the carpenters worked 8 hours a day. Four of them worked 5 days, 2 of them worked 10 days, and one worked 3 days. For how many hours of work did Mr. Todd have to pay?

5. The carpenters used 1 keg of wire nails weighing 1 cwt., 25 lb. of roofing nails and 15 pounds of spikes for the frame of the cottage. How many pounds of nails and spikes were used in all?

6. Mr. Todd bought $\frac{1}{8}$ of a gross of hinges for the doors. How many hinges is that?

7. Ted and Molly thought it would be great fun to paint the cottage themselves. They used 5 gal. 2 qt. of white paint for the first coat and 4 gal. 3 qt. for the second coat. For the porch floor, they used $5\frac{1}{2}$ gal. of gray paint, and they used 2 qt. of black paint for the window sashes. How much paint did they use in all?



The Cottage Plan
To what scale is it drawn?

8. When the cottage was finished, the lawn had to be rolled and seeded. How many square feet of lawn did they have, if the lot was 165 ft. by 132 ft. and the cottage covered a space 40 ft. by 30 ft. and the walks took up 120 sq. ft.? If 1 qt. of grass seed will seed 300 sq. ft. of lawn, how many quarts did they need to buy?

9. Molly helped make chair cushions, and curtains for 8 windows. Each of the two curtains for a window required 2 yd. 8 in. of material. 8 yd. 27 in. were used for the cushions. How many yards did they use in all?

10. Ted helped his father plant a row of shade trees across the back of the lot. The first tree was planted in the corner of the lot. If the lot was 165 ft. wide and the trees were planted 11 yd. apart, how many trees could they plant in the row?

11. The Todds moved to the lake on June 28 and came home on September 3. How long were they there? They lived in a tent from June 28 until July 17. How long was that?

12. It is $\frac{1}{4}$ of a mile from the Todds' cottage to Pike's Point. Ted swam to the Point and back one day. How many feet did he swim?

13. Some of the Todds' friends drove to Emerald Lake and took their lunch. There were 30 people to eat the picnic lunch.

They brought $1\frac{1}{2}$ pk. of potatoes and used 7 qt. How many quarts of potatoes were left?

If they planned to have 3 ears of corn for each of the 30 people, how many dozen ears did they buy?

How many pounds of sausage did they have, if each of 4 families brought 2 lb. 8 oz.?

The Todds gave each of the four families a basket of apples to take home. If there were $1\frac{1}{2}$ bushels to be divided equally, how many quarts were there for each family?

14. Next summer the Todds are going to have a garage and a tennis court. On a large piece of paper, draw to the scale of $\frac{1}{16}''$ to $1'$, a lot 132 ft. by 165 ft. Using the same scale, place on the lot a cottage 30 ft. by 40 ft., a garage 12 ft. by 16 ft. and a tennis court 36 ft. by 78 ft.

15. Make a plan of a cottage that you would like to have. Show the dimensions of each room and those of the whole cottage. Tell what scale you used.

16. Make a plan of the grounds, showing the cottage, garage, and garden.

WHAT DO I KNOW ABOUT DENOMINATE NUMBERS?

Complete these statements:

1. I can reduce 3 yd. 2 ft. to ft. by ——
2. I can change 72 in. to feet by ——
3. We find the area of a square by ——
4. We find the area of a rectangle by ——
5. We can find the perimeter of any rectangle by ——
6. To measure volume we use the units of ——
7. The dimensions of a 3-inch cube are ——
8. Before finding the volume, the length, width and heighth must be expressed in ——
9. There are —— cubic inches in one cubic foot.
10. There are —— sq. in. in one square foot.
11. There are —— sq. rd. in one acre.
12. A rug 12 ft. long and 8 ft. wide contains ——
13. One mile contains —— ft.
14. This expression is read 7′ 2″ by 2′ 6″.
15. There are —— pencils in one gross.
16. Three things sold by the dozen are ——
17. The bushel is commonly used to measure ——
18. In what way is a square different from other rectangles?
19. What does "drawing to scale" mean?
20. Is there any difference between $2\frac{1}{2}$ quarts and 2 qt. 1 pt.?
21. Why is 4 ft. 8 in. called a compound number?

PERCENTAGE

There were 100 words in the spelling test. John spelled 90 of them correctly. What part of the 100 words did he spell correctly?

You can give your answer as a fraction and say John spelled $\frac{90}{100}$ of the words correctly, or you can give your answer as a decimal and say John spelled .90 of the words correctly, as $\frac{90}{100} = .90$.

In school we do not say we have .90 of our work correct. We say we have 90 *per cent* of it correct.

In business, too, we use the word per cent for hundredths.

Per cent is another name for hundredths. The sign % is used to express _per cent_.

90% = 90 hundredths or .90 or $\frac{90}{100}$ or 90 per cent.

1. Read these decimals first as hundredths, and then read them as per cents instead of hundredths:

.01	.78	$.04\frac{1}{2}$	$.12\frac{1}{2}$	$.00\frac{1}{2}$
.65	.12	.08	$.62\frac{1}{2}$	$.00\frac{3}{4}$
.25	$.87\frac{1}{2}$	$.33\frac{1}{3}$	$.37\frac{1}{2}$	$.00\frac{1}{3}$

2. Read these fractions as per cents:

$\frac{1}{100}$	$\frac{10}{100}$	$\frac{15}{100}$	$\frac{9}{100}$	$\frac{50}{100}$
$\frac{5}{100}$	$\frac{3}{100}$	$\frac{12}{100}$	$\frac{25}{100}$	$\frac{40}{100}$
$\frac{75}{100}$	$\frac{12\frac{1}{2}}{100}$	$\frac{66\frac{2}{3}}{100}$	$\frac{87\frac{1}{2}}{100}$	$\frac{33\frac{1}{3}}{100}$

3. Read these per cents as hundredths:

5 %	10%	20 %	25 %	40%	50%
$12\frac{1}{2}$%	75%	$33\frac{1}{3}$%	$66\frac{2}{3}$%	90%	72%

FRACTIONS, DECIMALS AND PER CENT

How many cents are there in one dollar? How many cents are there in $\frac{1}{2}$ of a dollar? How many cents are there in $\frac{1}{4}$ of a dollar?

$\frac{1}{2}$ of a dollar = .50 or 50% of a dollar.

$\frac{1}{4}$ of a dollar = .25 or 25% of a dollar.

The easiest way to find 50% of $5640 is to find $\frac{1}{2}$ of it.

What is the easiest way to find 25% of $5640?

Many per cents can be expressed by the commonly used fractional parts of one hundred which you have learned. In working with per cents, use fractions when you think they will make your work simpler.

$8\frac{1}{3}\% = .08\frac{1}{3} = \frac{1}{12}$	$37\frac{1}{2}\% = .37\frac{1}{2} = \frac{3}{8}$
$10\% = .10 = \frac{1}{10}$	$40\% = .40 = \frac{2}{5}$
$12\frac{1}{2}\% = .12\frac{1}{2} = \frac{1}{8}$	$50\% = .50 = \frac{1}{2}$
$16\frac{2}{3}\% = .16\frac{2}{3} = \frac{1}{6}$	$62\frac{1}{2}\% = .62\frac{1}{2} = \frac{5}{8}$
$20\% = .20 = \frac{1}{5}$	$66\frac{2}{3}\% = .66\frac{2}{3} = \frac{2}{3}$
$25\% = .25 = \frac{1}{4}$	$75\% = .75 = \frac{3}{4}$
$33\frac{1}{3}\% = .33\frac{1}{3} = \frac{1}{3}$	$87\frac{1}{2}\% = .87\frac{1}{2} = \frac{7}{8}$

1. In a school of 640 pupils, 75% are boys. How many boys and how many girls are there in the school?

2. Mr. Smith earned $48 a week last year, but this year his earnings have increased $37\frac{1}{2}\%$. What are his earnings this year?

3. A farmer had a herd of 240 cows. He sold $16\frac{2}{3}\%$ of them. How many did he sell? How many did he have left?

Copy and complete these tables:

Fraction	Decimal	Per cent
$\frac{1}{2}$		
	.25	
		75%
$\frac{1}{3}$		
	$.66\frac{2}{3}$	
		$12\frac{1}{2}\%$
$\frac{1}{5}$		

Fraction	Decimal	Per cent
	$.37\frac{1}{2}$	
$\frac{1}{12}$		
	$.62\frac{1}{2}$	
$\frac{7}{8}$		
		10%
$\frac{2}{5}$		
		$16\frac{2}{3}\%$

Remember: 100% = 100/100 = 1.
100% of a number is that number.
100% of \$25 = \$25. 200% of \$25 = \$50.

Can you answer these questions?

1. What is 100% of 50 words? Of \$25? Of 1000 bricks?
2. If 50 words is 100%, what is 200%?
3. If 50 words is 100%, what is 500%?
4. If \$25 is 100%, what is 150%? What is 200%?
5. If \$25 is 100%, what is 300%? What is 400%?
6. What is 1% of 100? What is 10% of 100?
7. If 1000 bricks are 100%, what is 1%?
8. What is 1% of \$25? Of 500 words?

What is your mark if you have answered all of these questions correctly?

FINDING A PER CENT OF A NUMBER

Using a fraction to find a per cent of a number is not always the easiest way. You might need to know 17% or 29% of a number. These per cents would make the fractions $\frac{17}{100}$ and $\frac{29}{100}$. Such fractions are too large to use easily.

George had 28 dollars in the school bank. Charles had only 17% of that amount. How much had Charles?

How to Find 17 Per Cent of $28

17% of \$28 = .17 of 28	Write 17% as .17.
$.17 \times 28 = 4.76$	Multiply 28 by .17.

Charles had $4.76.

Work each of these examples the easier way:

1. 75% of 184
2. $12\frac{1}{2}$% of 96
3. 26% of 250
4. $87\frac{1}{2}$% of 128
5. 112% of 108
6. $37\frac{1}{2}$% of 96
7. 32% of 604
8. 60% of 140
9. $33\frac{1}{3}$% of 900
10. 10% of 850
11. 2% of 500
12. 14% of 455
13. 3% of 1200
14. 150% of 600
15. 45% of 740
16. 25% of 144
17. 20% of 155
18. $16\frac{2}{3}$% of 126
19. 7% of 139
20. 24% of 305
21. 18% of 231
22. 120% of 500

FINDING WHAT PER CENT ONE NUMBER IS OF ANOTHER

There were 25 words in the spelling lesson. Rose spelled only 21 of them correctly. What per cent of the words did she spell correctly?

21 Is What Per Cent of 25?

$21 = \frac{21}{25}$ of 25

$\frac{21}{25} = 21 \div 25 = .84 = 84\%$

As 21 is $\frac{21}{25}$ of 25, divide 21 by 25. Write the quotient as a per cent.

Rose spelled 84% of the words correctly.

In each of these groups, the first number is what per cent of the second? 27 is what % of 81?

1.	27 of 81	9.	28 of 35	17.	22 of 88
2.	72 of 96	10.	48 of 64	18.	60 of 75
3.	120 of 144	11.	14 of 42	19.	75 of 200
4.	75 of 300	12.	25 of 150	20.	55 of 110
5.	30 of 45	13.	5 of 50	21.	80 of 320
6.	35 of 50	14.	15 of 90	22.	20 of 100
7.	125 of 200	15.	27 of 63	23.	30 of 120
8.	50 of 150	16.	20 of 25	24.	60 of 100

1. There are 36 pupils in our class. Only 30 are present today. What per cent of the pupils in the class are present?

2. Mr. Rose earns $200 a month and spends $75 for rent. What per cent of his earnings does he spend for rent?

3. Our furnace burns 400 pounds of coal each week. This is what per cent of a ton?

PROBLEMS

The Hill family had an income of $240 a month. This was their whole income for a month, or 100%. They planned to use it in this way:

The Hill's Budget	
Rent	25%
Food	20%
Heat, light and supplies	10%
Clothing	$12\frac{1}{2}$%
Other expenses	15%
Savings	$17\frac{1}{2}$%
	100%

1. Find how much money was allowed for each item in the Hill's budget.

2. At the rate of $240 a month, what was the Hill's yearly income? How much money was allowed for each item for the year?

3. Mrs. Hill's expense account showed that during June they spent $60 for rent; $40 for food; $9 for heat, light and supplies; $50 for clothing. What per cent of $240 did they spend for each item? What per cent did they save during June?

4. In August they spent $12 for heat, light and supplies. What per cent of $240 was this?

5. During September Mrs. Hill spent 15% of the $240 for clothing. How much more money did she spend than she had planned in her budget?

6. At Christmas time the Hills spent $18 in buying presents. What per cent of the $240 was this?

7. Plan a monthly budget for your allowance, using percentages.

FINDING A NUMBER WHEN A PER CENT OF IT IS GIVEN

Sixty per cent of the pupils in our school are girls. If there are 240 girls, how many pupils are there in the school?

240 Is 60% of What Number?

$60\% = \frac{3}{5}$
$\frac{3}{5}$ of the pupils = 240 pupils.
$\frac{1}{5}$ of the pupils = $\frac{1}{3}$ of 240 pupils or 80 pupils. Why?
$\frac{5}{5}$ of the pupils = 5×80 pupils or 400 pupils. Why?

or

60% of the pupils = 240 pupils.
1% of the pupils = $\frac{1}{60}$ of 240 pupils or 4 pupils.
100% of the pupils = 100×4 pupils or 400 pupils.

There are 400 pupils in our school.

1. Leon set out 60 celery plants in the school garden. That was 40% of all the plants set out by the whole class. How many plants were set out by all?

2. 20 pages, or $16\frac{2}{3}\%$ of a reading book, were illustrated. How many pages were not illustrated?

3. The boys sold 140 tickets for the basketball game. That was 70% of all the tickets that were sold. How many tickets were sold?

4. A boy sold his bicycle at a loss of $15, which was 25% of what it cost him. How much did it cost?

5. James sold 40% of his rabbits for $8.00. At that rate what was the value of the rabbits that he kept?

6. During a sale some goods were sold for $25.80, which was 60% of their usual price. What was the usual price?

TESTS IN PERCENTAGE

I

1. $20\% =$ what fraction?
2. $\frac{3}{8} =$ what per cent?
3. $50\% =$ what fraction?
4. $\frac{7}{8} =$ what per cent?
5. $40\% =$ what fraction?
6. $\frac{5}{8} =$ what per cent?
7. $66\frac{2}{3}\% =$ what fraction?
8. $\frac{3}{4} =$ what per cent?
9. $60\% =$ what fraction?
10. $\frac{1}{3} =$ what per cent?
11. $12\frac{1}{2}\% =$ what fraction?
12. $\frac{1}{4} =$ what per cent?

II

1. 25% of $48 =$
2. 60% of $75 =$
3. $33\frac{1}{3}\%$ of $60 =$
4. 40% of $160 =$
5. 75% of $200 =$
6. $12\frac{1}{2}\%$ of $80 =$
7. $66\frac{2}{3}\%$ of $150 =$
8. 20% of $300 =$
9. 10 is what % of 40?
10. 25 is what % of 75?
11. 20 is what % of 120?
12. 15 is what % of 75?
13. 30 is what % of 150?
14. 12 is what % of 60?
15. 40 is what % of 200?
16. 16 is what % of 48?

III

1. Charles sleeps $33\frac{1}{3}\%$ of the time. How many hours does he sleep each day?

2. Five hundred pounds of coal equal what % of a ton?

3. Frank had saved \$16, but spent $37\frac{1}{2}\%$ of it for a pair of snow-shoes. How much did the snow-shoes cost?

4. Mary is 12 and her mother is 36. Mary's age is what % of her mother's age? The mother's age is what % of Mary's?

BASEBALL PERCENTAGES

The following report was copied from the sporting page of a morning paper.

Standings in the Major Leagues							
American League				National League			
	Won	Lost	Per cent		Won	Lost	Per cent
Washington	83	46	.643	Pittsburgh	82	47	.636
Phila'phia	74	51		New York	76	58	
Chicago	69	60		Cincinnati	70	62	
St. Louis	68	60		Brooklyn	62	67	
Detroit	66	60		St. Louis	62	70	
Cleveland	60	70		Boston	61	73	
New York	54	72		Chicago	58	76	
Boston	37	92		Phila'phia	55	73	

The teams of the two leagues are arranged in order of standing, with the highest first.

The Washington team played 129 games (83 + 46) and won $\frac{83}{129}$ of all the games they played. $\frac{83}{129} = .6434$. As it is customary to express decimal results in three figures, the final 4 is dropped.

The percentage of games won by the Pittsburgh club is .6356. When any figure of a decimal is dropped, the preceding figure is increased by 1, if the number that is dropped equals 5 or more. No change is made when the number that is dropped is less than 5. .6356 = .636

Find the % of games won by each of the other clubs.

MR. CLARK'S SALE

Mr. Clark has a men's clothing and furnishing store. About the middle of August, he found that he still had a large supply of straw hats and summer suits that he was not likely to sell so late in the season. If he kept the hats and suits until the next season, they might be out of style. Besides, he needed all of the room for his fall stock. In order to encourage people to buy his goods quickly, he decided to sell his hats at 50% below the regular price, and his suits at $33\frac{1}{3}\%$ below the regular price. Within a week he had sold his entire stock.

When an article is sold at less than the regular price, the amount that is taken off is called the *discount*.

The regular price is called the *list price*.

The price at which an article is sold after taking off the discount is called the *net price*.

The usual price of one of Mr. Clark's suits was $30. It was sold at $33\frac{1}{3}\%$ discount. Find the discount and the net price.

How to Find the Discount

$33\frac{1}{3}\% = \frac{1}{3}$	Multiply the usual price by the per cent of discount.
$\frac{1}{\cancel{3}} \times \overset{10}{\cancel{30}} = 10$	To find the net price, subtract the discount from the list price.
$30 - 10 = 20$	The discount was $10.
	The net price was $20.

Mr. Smith bought a suit at $36.00 in July. What would he have saved if he had waited for the August sale and bought at $33\frac{1}{3}\%$ off?

DISCOUNT

Find the discount and the net price on these goods sold during Mr. Clark's August sale:

Hats at 50% off	Suits at $33\frac{1}{3}$% off	
1. \$1.50	1. \$12.00	8. \$30.00
2. \$2.00	2. \$12.50	9. \$32.25
3. \$2.20	3. \$15.00	10. \$34.75
4. \$2.25	4. \$18.00	11. \$35.00
5. \$2.50	5. \$20.00	12. \$37.50
6. \$3.00	6. \$22.50	13. \$40.00
7. \$5.00	7. \$25.00	14. \$50.00

Shirts at 25% off	Ties at 15% off	Fancy Socks at $16\frac{2}{3}$% off
1. \$1.69	1. \$ .75	1. \$1.50
2. \$1.89	2. \$1.50	2. \$1.95
3. \$2.25	3. \$1.00	3. \$2.25
4. \$2.49	4. \$2.00	4. \$2.00

Use the discounts above for these problems:

1. Mr. Clapp bought a suit marked \$32.25, a hat marked \$2.50 and 2 shirts marked \$2.49 each. What did he have to pay for them all?

2. A college boy bought 3 pairs of socks marked \$1.95 and 2 ties marked \$1.50. What was the total discount that he received? What was the net price?

3. If a man bought a suit marked \$40.00, a tie marked \$2.00 and 2 pairs of socks marked \$2.25, what was the total list price of all? What was the total net price of all?

BARGAIN SALES

Many buyers are able to save quite a bit by buying on "Bargain Days" and at "Thrift Sales" when a discount is given from the usual selling price of goods. It is important to know how much we are saving when we buy at a discount.

Find the net prices of articles marked as follows. Use fractional parts when they make the examples easier.

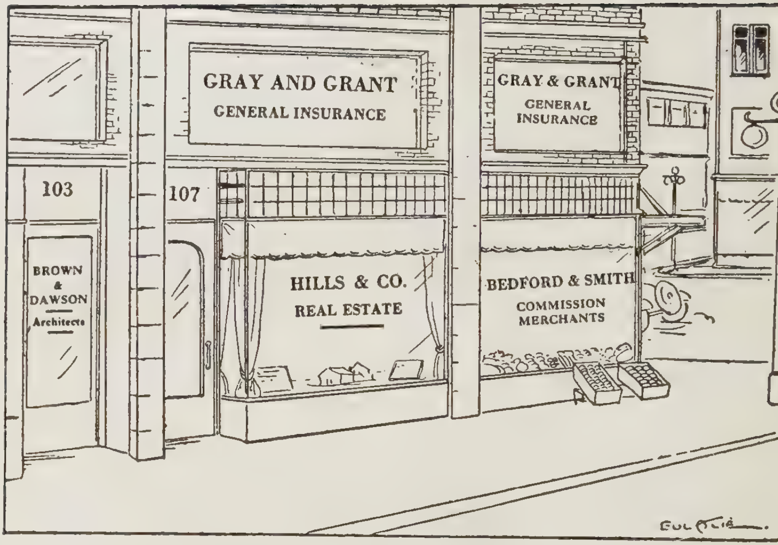
	Price	Discount		Price	Discount		Price	Discount
1.	\$8	20%	8.	\$21	40%	15.	\$60	20%
2.	\$10	10%	9.	\$26	25%	16.	\$72	25%
3.	\$12	15%	10.	\$20	20%	17.	\$96	50%
4.	\$16	$12\frac{1}{2}$%	11.	\$30	50%	18.	\$120	20%
5.	\$15	25%	12.	\$32	$37\frac{1}{2}$%	19.	\$150	$12\frac{1}{2}$%
6.	\$18	20%	13.	\$36	$12\frac{1}{2}$%	20.	\$180	20%
7.	\$20	$33\frac{1}{3}$%	14.	\$35	15%	21.	\$240	25%

1. During Thrift Week a grocer sold flour at 10% discount. Find the cost of a bag of flour marked \$1.44. How much was saved by buying at the sale?

2. A dealer in fruit sold oranges marked to sell at 60 cents a dozen at a discount of 25%. Find the selling price.

3. At a special sale a boy bought a \$40 bicycle at $\frac{1}{5}$ less than the price. How much did he pay for it? How much did he save?

4. Fred's mother bought him an overcoat that was marked \$30 with a discount of 20%. How much did the coat cost? How much did she save?



WORKING ON COMMISSION

A man who wishes to sell his house may not be able to find a purchaser, so he may ask a real estate agent to sell the house for him.

A man may employ an architect to make a plan of the house he wishes to build.

Architects who make plans of buildings are paid a per cent of the cost of the building, and agents who sell property for other people charge a certain per cent of the selling price for their services.

The money that is paid for services to one who buys or sells property or does business for another is called a *commission.*

An agent who sells for others such things as fruits or garden products for a per cent of the selling price is called a *commission merchant.*

PROBLEMS IN COMMISSION

A real estate agent sold a house for \$12,500. Find the amount of his commission at 5%.

How to Find Commission

\$12,500 .05	Multiply the sales price by the per cent allowed for commission.
\$625.00	The agent's commission was \$625.

1. A real estate dealer sold a farm for \$4,800. Find the amount of his commission at 4%.

2. A Philadelphia commission merchant sold 4 crates of strawberries for a New Jersey farmer for \$4.48 a crate. Find the amount of his commission at 2%.

3. A real estate dealer sold six city lots at \$2,850 a lot. Find the amount of his commission at 5%.

4. A commission merchant sold 50 barrels of apples for a customer at \$6.40 a barrel, and was paid a commission of 4%. What was his commission?

5. A real estate agent sold a house for \$18,000 and was paid a commission of 4%. Find the amount of his commission.

6. A real estate agent sold a lot for a customer for \$1,500. Find the agent's commission at 5% and the amount that the owner of the lot received after paying the commission.

7. A commission merchant sold 2 crates of eggs for \$9 a crate and was paid a commission of 5%. Find the amount of the commission.

PROFIT AND LOSS

A merchant has to pay for the things he sells. He also may have to pay rent for his store. If he owns the store, he has to pay taxes, insurance and repairs. He has to pay his clerks. All such expenses are called *selling expenses* or *overhead.*

A merchant adds to the cost price of each article that he sells an amount which he thinks is its share of the overhead. The sum is called the total cost. If he sells the articles for more than this total cost, he has *gained* or made a *profit.* If he sells for less than the total cost, he has *lost.* Profit and loss are usually reckoned as a per cent of the cost price.

Dorothy paid $1.80 for 12 chickens and $5.70 for their food. This was a total cost of $7.50. She sold them at a gain of 60%. What was her profit? Find her loss if she had sold the chickens at a 16% loss.

How to Find the Profit

60% of \$7.50 =	Multiply the total cost by the per cent of gain, or by the fraction which equals that per cent.
$60\% = \frac{3}{5}$	
$\frac{3}{\cancel{5}} \times \overset{1.50}{\cancel{7.50}} = 4.50$	Dorothy's profit was \$4.50.

How to Find the Loss

16% of \$7.50 =	Multiply the total cost by the per cent of loss or by the fraction which equals that per cent.
$.16 \times 7.50 = 1.20$	The loss would be \$1.20.

Find the gain or loss:

Total cost	Gain	Total cost	Loss
1. $72	$16\frac{2}{3}\%$	5. $1600	$7\frac{1}{2}\%$
2. $656	$12\frac{1}{2}\%$	6. $326.50	10%
3. $720	20%	7. $678.29	5%
4. $3.50	12%	8. $267.98	19%

FINDING THE SELLING PRICE WHEN THERE IS A PROFIT

If pencils cost $4.40 a gross and were sold at a profit of 25%, what was the selling price?

How to Find the Selling Price When There Is a Profit

$25\% = \frac{1}{4}$

$\frac{1}{4}$ of $4.40 = $1.10	Multiply the cost by the rate of profit.
$1.10 + $4.40 = $5.50	To find the selling price add the profit to the cost.

The selling price was $5.50.

1. A druggist sold hot water bottles that cost $2.00 at a gain of 25%. What was the selling price?

2. A grocer bought apples at $4.50 a barrel, and sold them so as to gain 10%. What was the selling price?

3. A grocer bought a crate of 30 dozen eggs for $12 and sold the eggs at a profit of 25%. At what price did he sell them?

4. A dealer bought a crate of strawberries for $6.40 and sold them at a gain of $12\frac{1}{2}\%$. How much was he paid?

FINDING THE SELLING PRICE WHEN THERE IS A LOSS

A stock of goods that cost \$1800 was sold at a fire sale at a loss of 22%. What was the selling price?

How To Find the Selling Price When There Is a Loss

22% = .22	To find the loss multiply the cost by the rate of loss.
.22 × \$1800 = \$396	
\$1800 − \$396 = \$1404	To find the selling price subtract the loss from the cost.

The goods sold for \$1404.

1. Mr. Burt bought a house for \$10,350 and later sold it at a loss of 3%. What was the selling price?

2. At the end of the summer a department store sold its remaining stock of bathing caps at a loss of 25%. How much was received for the caps if they cost \$36?

3. On Christmas Eve a dealer sold trees that cost him \$25 at a loss of 35%. How much did he receive for the trees?

4. A fruit dealer sold the stock that he had left on Saturday night at a loss of 28%. If the fruit cost him \$30, for how much did he sell the fruit?

5. Mr. Rice sold an automobile that cost him \$2700 at a loss of $33\frac{1}{3}$%. How much was he paid for the car?

6. A grocer had an extra large supply of eggs that cost him \$52. If he had to sell them at a loss of 25% to get rid of them, what was he paid for them?

INTEREST

When you use something that belongs to some one else you often pay for the use of it. You pay rent for a canoe at the lake, or you pay rent for a room in a hotel. When money is used by some one who does not own it, he pays for the use of it.

A bank pays for the use of the money that people deposit in the bank.

A man who borrows money from the bank or from some other person pays for the use of the money.

Money that is paid for the use of money is called *interest*.

The money borrowed, or the money deposited in a bank, for which interest is paid, is called the *principal*.

The interest for a year is figured by finding a certain per cent of the principal. The per cent used is called the *rate of interest*. The interest on $100 for one year at the rate of 6% is $6.

FINDING THE INTEREST

Mr. Thompson borrowed $400 at 6% to build a garage. How much interest did he have to pay each year?

How to Find the Interest for One Year

$400	Principal	Multiply the amount that is borrowed by the rate of interest.
.06	Rate	
$24.00	Interest	Mr. Thompson had to pay $24 a year.

Find the interest on each of these amounts for one year at the given rate:

1. $500 at 6%
2. $400 at 3%
3. $800 at 6%
4. $550 at 3%
5. $300 at 6%
6. $500 at 7%

FINDING INTEREST

Find the interest for 1 year on each of the following amounts at the given rate:

1.	\$350 at 5%	11.	\$625 at 7%	21.	\$1000 at 7%
2.	\$420 at 6%	12.	\$955 at 5%	22.	\$1100 at 6%
3.	\$545 at 7%	13.	\$790 at 4½%	23.	\$1200 at 3%
4.	\$280 at 6%	14.	\$848 at 6%	24.	\$1040 at 8%
5.	\$475 at 4%	15.	\$445 at 4%	25.	\$2060 at 5%
6.	\$625 at 5%	16.	\$396 at 5%	26.	\$1400 at 4½%
7.	\$850 at 6%	17.	\$980 at 8%	27.	\$1600 at 5%
8.	\$310 at 4%	18.	\$555 at 5%	28.	\$1550 at 3%
9.	\$775 at 6%	19.	\$736 at 6%	29.	\$1430 at 8%
10.	\$560 at 5%	20.	\$885 at 4%	30.	\$2000 at 5%

1. John saved \$150. If he loaned it at 4%, how much interest was he paid the first year?

2. Mr. Rhodes borrowed \$2500 at 6% to invest in real estate. How much interest does he pay each year?

3. Mr. Todd has \$1000 invested in a railroad bond that pays 5½% interest. How much interest is he paid each year?

4. Mary has \$200 that pays 4% interest. Her brother has \$200 that pays only 3½%. How much more interest does Mary receive in a year than her brother?

5. A man who had \$2000 invested in a business that paid 4%, drew out his money and invested it in a business that paid 8%. How much more interest did the second business pay in a year than the first?

USING PERCENTAGE IN PROBLEMS

1. Find $62\frac{1}{2}\%$ of \$1,200.

2. \$50 is what per cent of \$150?

3. A man who had a farm of 160 acres sold 40 per cent of it. How many acres did he have left?

4. What per cent of my month's salary of \$250 is left when \$150 has been spent?

5. Mr. Baxter is paid an annual salary of \$3,000. He plans to use not more than 25% of it for rent. What is the highest rent per month he can pay and keep within his budget?

6. John's marks in arithmetic for 5 days were: 90%, 85%, 80%, 95%, 100%. What was his average standing for the week?

7. Willard is afraid that he has not done well on his spelling examination, which contained 60 words. He is wondering what is the largest number of words he could miss and have a mark of 75%. Can you tell?

8. A ball player made 31 hits in 85 times at bat. What was his batting average?

9. A farmer received \$1,650 last year for his potatoes. If this year's crop is worth 20% more, how much should he receive this year?

10. Find the cost of 60 books listed at 85¢ each with a discount of 20% allowed.

11. A bill collector had bills to collect as follows: \$90, \$125.75, \$230, \$67.25. He succeeded in collecting 80% of the total amount of the four bills. He charged 10% commission on the amount collected. What was his commission?

12. A Maryland peach grower sent 500 baskets of peaches to market in Washington. They were sold at \$1.10 a basket. Find the merchant's commission at 3%.

13. An agent collected a debt of \$750. He charged 10% commission. What was his commission?

14. For making plans and superintending the construction of a house costing \$12,000, an architect was paid a commission of 5%. Find the amount of his commission.

15. An automobile salesman sold a car for \$1,500 and was paid a commission of 15%. Find the amount of his commission.

16. At what price will a pocket knife sell, if it was bought at the rate of \$5.76 a dozen and the dealer gains $12\frac{1}{2}$% in making the sale?

17. The new Memorial School is to cost \$275,000. Mr. Calkins, the architect, is to receive 6% of the cost for drawing the plans and supervising the work of the building. How much will Mr. Calkins receive?

18. An automobile dealer bought for his own use a car priced at \$1,460. If he was allowed a discount of 15%, what did the car cost him?

19. A farmer borrowed \$6,500. How much interest did he pay for a year at 6%?

20. Mr. White bought a house for \$11,000. He paid \$250 for painting it and \$166 for repairs. After a year he sold it at a gain of 10%. What was he paid for it?

21. Guy's father bought a car for \$1250. After he had run it a year it was worth 20% less. What was it then worth?

WHAT I KNOW ABOUT PERCENTAGE

1. Per cent means ——

2. The whole is always what per cent?

3. I can change 125% to a mixed number by ——

4. I change a fraction to a per cent by ——

5. To find a per cent of a number I ——

6. To find what per cent one number is of another number I ——

7. When I multiply the cost by the per cent of gain, I have found the ——

8. I can find the discount by multiplying the —— by the ——

9. Interest is ——

10. The money on which interest is figured is called the ——

11. In order to find the interest I must know ——

12. By multiplying the amount of sales by the rate of —— I can find ——

13. If I know the cost and the rate of profit, I can find the selling price by ——

14. If I know the cost and the rate of loss, I can find the selling price by ——

15. Commission is ——

16. I can find the amount of commission on a sale if I know —— and ——

TESTING OUR PROGRESS—TEST I

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $$\begin{array}{r}\$585.89\\ 9.85\\ 949.98\\ 8.79\\ 684.65\\ 9.79\\ \hline\end{array}$$

2. $$\begin{array}{r}\$17586.10\\ -9436.32\\ \hline\end{array}$$

3. $$\begin{array}{r}6974\\ \times 708\\ \hline\end{array}$$

4. $79\overline{)63516}$

5. $217\overline{)20181}$

6. Add: $4\frac{3}{4}$, $7\frac{3}{8}$, $1\frac{1}{2}$.

7. Multiply: $16\frac{2}{3}$ by 12.

8. Subtract: $3\frac{3}{5}$ from $8\frac{3}{4}$.

9. Divide: $7\frac{1}{2}$ by $2\frac{1}{4}$.

10. Find the sum: $.699 + 6.87 + .55 + 56.2$.

11. Copy and place the decimal point in the product:

$$\begin{array}{r}.25\\ .3\\ \hline 75\end{array} \qquad \begin{array}{r}.0875\\ 9\\ \hline 7875\end{array} \qquad \begin{array}{r}.06\\ 100\\ \hline 600\end{array} \qquad \begin{array}{r}.475\\ 1000\\ \hline 475000\end{array}$$

12. Copy and place the decimal point in the quotients. Fill the vacant places with zeros if necessary:

$$\begin{array}{r}552\\ .5\overline{)276}\end{array} \qquad \begin{array}{r}252\\ .4\overline{)10.08}\end{array} \qquad \begin{array}{r}72\\ 81\overline{)5.832}\end{array} \qquad \begin{array}{r}4392\\ .09\overline{)3.9528}\end{array}$$

13. $960 \div 300$.

14. $\$18 \div 20 =$

15. $\$16.75 \div .25 =$

Rate yourself—

1 to 9 correct = Poor
10 or 11 correct = Fair
12 or 13 correct = Good
14 or 15 correct = Excellent

TESTING OUR PROGRESS—TEST II

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. $7\overline{)\$548.52}$

2. $307\overline{)20876}$

3.
$$\begin{array}{r} \$672.99 \\ 99.53 \\ 886.96 \\ 87.97 \\ 439.79 \\ 78.97 \\ \hline \end{array}$$

4.
$$\begin{array}{r} \$13914.95 \\ -9229.09 \\ \hline \end{array}$$

5.
$$\begin{array}{r} \$46.78 \\ \times 69 \\ \hline \end{array}$$

6. $4\frac{1}{2} + 2\frac{1}{2} + 6\frac{3}{8} =$

7. 36 yd. $\div \frac{2}{3}$ yd. $=$

8. $48 \times 33\frac{1}{3} =$

9. $.752 \div .12\frac{1}{2} =$

10. State how you know that:

$8 \times 9\frac{3}{4}$ is less than 80 and more than 72.

11. A recipe calls for $2\frac{1}{2}$ cups of sugar. How much sugar should be used for one-half the amount of the recipe?

12. Use a short method to find the cost of 86 yd. of ribbon at 25¢ a yard.

13. $7\frac{1}{2} \div 4\frac{1}{2} =$

14. $1\frac{3}{5} - \frac{7}{10} =$

15. $\frac{7}{8} \times 1\frac{3}{4} =$

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

TESTING OUR PROGRESS—TEST III

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. Write as per cents: $\frac{2}{5}$, $\frac{1}{3}$, $\frac{3}{8}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{7}{8}$

2. Find 9% of $23.50. 3. What per cent of 8 is 2?

4. What per cent of a dollar is 6 cents?

5. Write $2\frac{1}{2}$ as a mixed decimal.

6. What is the difference between $\frac{1}{2}$ of 100 and $\frac{1}{2}$% of 100?

7. How many decimal places should be pointed off in the product of each of these examples?

a. $26.4 \times .036$ *b.* $.0425 \times 1.7$ *c.* 3.1416×18.25

8. Express as fractions or mixed numbers:

$87\frac{1}{2}\%$ 150% 60% 180%

9. $2\frac{1}{2}$ yards is what per cent of $7\frac{1}{2}$ yards?

10. $27 is what per cent of $36?

11. What per cent of 18 days are 3 days?

12. How many minutes are there in $16\frac{2}{3}\%$ of an hour?

13. Find 25% of 48 inches. 14. Find 8% of 830.

15. State how to find a per cent of a number.

Rate yourself—

1 to 9 correct = Poor	12 or 13 correct = Good
10 or 11 correct = Fair	14 or 15 correct = Excellent

TESTING OUR PROGRESS—TEST IV

Many sixth grade pupils can do all of these examples in 15 minutes. How many can you do?

At the end of 15 minutes, make a cross after your last answer. Then complete the test. Work again those examples that are wrong.

1. Four is what per cent of 8? Of 16? Of 12?

2. Albert has 8 out of 10 words correct. What per cent are correct?

3. Five dollars discount on $35 is what per cent off?

4. A bicycle listed at $60 can be bought at a discount of $12\frac{1}{2}$%. What will a dealer pay for 15 of these bicycles?

5. Find the selling price of a hat that cost $2.20 and was marked to sell at a gain of 20%.

6. A town of 20,000 increased 150% in ten years. What was the population at the end of ten years?

7. Find 40% of $840.

8. A basket ball team won 9 out of 12 games played. What per cent of the games was won?

9. What is the commission at 3% on the sale of a $12000 house?

10. Find a 5% discount on a bill of $81.65.

11. Find the interest on $2900 for 2 years at 6%.

12. The list price of arithmetics was 76 cents. Find the net price of 138 arithmetics if they were sold at a discount of 20%.

Rate yourself—

1 to 7 correct = Poor	9 or 10 correct = Good
8 correct = Fair	11 or 12 correct = Excellent

TESTS

These tests are a "catch up" on all your number work. If you fail on an example, study it to find the trouble. Then turn back in your book for further practice. Try to make 100% on each test.

ADDITION

1.	2.	3.	4.	5.
$179.65	$77.98	$45.68	.154	$3.25
24.68	33.74	85.72	.436	7.12
	6.64	.85	.167	.96
		45.97	.0221	5.04
				2.89

6.	7.	8.	9.	10.
.987	.301	784.4	29.17	12.
.8690	.87	8.976	400.06	56.3
.139	.551	574.9	66.31	500.24
.0979	.09	3.88	25.872	12.215
			34.467	501.013
				34.577

SUBTRACTION

1.	2.	3.	4.	5.
8.4	10.5	7.35	3.57	12.38
5.2	4.5	4.32	1.37	3.06

6.	7.	8.	9.	10.
146.93	126.23	158.26	138.40	66.1
81.44	31.78	92.68	60.57	62.62

11.	12.	13.	14.
1159.00	1186.086	179.14	489.95
348.03	439.04	90.186	70.093

15.	16.	17.	18.
963.57	1353.364	52000	359000
264.80	408.705	13786	273000

TESTS

MULTIPLICATION

1. $\begin{array}{r}9.8\\ 4\\ \hline\end{array}$	2. $\begin{array}{r}\$6.78\\ 9\\ \hline\end{array}$	3. $\begin{array}{r}\$7.89\\ .6\\ \hline\end{array}$	4. $\begin{array}{r}\$8.76\\ .08\\ \hline\end{array}$	5. $\begin{array}{r}\$7.90\\ .49\\ \hline\end{array}$
6. $\begin{array}{r}39.54\\ 9.8\\ \hline\end{array}$	7. $\begin{array}{r}76.98\\ 6.07\\ \hline\end{array}$	8. $\begin{array}{r}1.235\\ .506\\ \hline\end{array}$	9. $\begin{array}{r}53.14\\ .97\\ \hline\end{array}$	10. $\begin{array}{r}90.2\\ 9.06\\ \hline\end{array}$

SHORT DIVISION

1. $3\overline{)6.30}$	2. $4\overline{)12.04}$	3. $2\overline{)1.816}$
4. $5\overline{)35.45}$	5. $6\overline{)481.2}$	6. $.5\overline{)42.15}$
7. $.6\overline{)2.244}$	8. $7\overline{)34.44}$	9. $9\overline{).549}$
10. $8\overline{)3.176}$	11. $9\overline{).4437}$	12. $6\overline{)41.70}$
13. $7\overline{)45.99}$	14. $9\overline{)7.875}$	15. $3\overline{)292.95}$
16. $7\overline{)585.97}$	17. $.04\overline{)30.792}$	18. $8\overline{)52.672}$

LONG DIVISION

1. $21\overline{)42}$	2. $14\overline{)196}$	3. $23\overline{)1449}$
4. $32\overline{)1120}$	5. $34\overline{)1836}$	6. $46\overline{)2576}$
7. $43\overline{)10836}$	8. $73\overline{)29638}$	9. $212\overline{)11448}$
10. $743\overline{)200.61}$	11. $17\overline{)6998}$	12. $29\overline{)8512}$
13. $27\overline{)8029}$	14. $27\overline{)16038}$	15. $39\overline{)27105}$

ADDING FRACTIONS

1. $\frac{1}{5}+\frac{3}{5}$	2. $\frac{1}{2}+\frac{1}{4}$	3. $\frac{1}{2}+\frac{3}{5}$
4. $\frac{3}{4}+\frac{5}{8}$	5. $\frac{3}{4}+1\frac{1}{2}$	6. $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}$
7. $\frac{1}{4}+\frac{1}{2}+\frac{1}{5}$	8. $\frac{1}{6}+\frac{3}{4}+\frac{1}{2}$	9. $5\frac{5}{6}+6$
10. $4\frac{1}{3}+3\frac{1}{2}$	11. $5\frac{3}{4}+6\frac{2}{3}$	12. $5\frac{1}{4}+2\frac{1}{2}+6\frac{2}{3}$

TESTS

SUBTRACTING FRACTIONS

1. $\frac{3}{5} - \frac{1}{5}$	2. $\frac{7}{8} - \frac{3}{4}$	3. $\frac{2}{3} - \frac{1}{2}$
4. $5 - \frac{3}{10}$	5. $8\frac{2}{5} - 3$	6. $3\frac{7}{8} - 2\frac{3}{8}$
7. $6\frac{3}{4} - 4\frac{1}{2}$	8. $5\frac{2}{5} - 3\frac{1}{4}$	9. $5\frac{1}{6} - 3\frac{5}{6}$
10. $8\frac{1}{3} - 5\frac{3}{4}$	11. $6 - 3\frac{5}{8}$	12. $10 - 4\frac{2}{3}$

MULTIPLYING FRACTIONS

Cancel when you can:

1. $2 \times \frac{3}{8}$	2. $\frac{1}{10} \times 8$	3. $4 \times \frac{3}{4}$
4. $\frac{4}{5} \times 6$	5. $\frac{1}{4} \times \frac{1}{2}$	6. $\frac{1}{2} \times \frac{2}{3}$
7. $\frac{9}{10} \times \frac{5}{6}$	8. $\frac{1}{2} \times \frac{1}{3}$	9. $\frac{1}{3} \times \frac{3}{4}$
10. $\frac{8}{9} \times \frac{3}{10}$	11. $2\frac{2}{3} \times \frac{3}{8}$	12. $2\frac{1}{2} \times 4$
13. $5\frac{1}{4} \times 6\frac{4}{5}$	14. $20 \times 5\frac{3}{4}$	15. $35 \times 6\frac{2}{3}$
	16. $4\frac{3}{4} \times 5\frac{7}{8}$	

DIVIDING FRACTIONS

1. $\frac{7}{8} \div \frac{1}{8}$	2. $\frac{3}{4} \div \frac{5}{8}$	3. $\frac{4}{5} \div \frac{3}{8}$
4. $\frac{7}{10} \div \frac{7}{10}$	5. $12 \div \frac{2}{3}$	6. $\frac{4}{5} \div 8$
7. $4\frac{2}{3} \div \frac{5}{6}$	8. $\frac{5}{12} \div 3\frac{3}{4}$	9. $8 \div 4\frac{4}{5}$
10. $5\frac{5}{8} \div 6$	11. $6\frac{1}{4} \div 2\frac{1}{2}$	12. $5\frac{3}{4} \div 2\frac{2}{3}$

PLACING THE DECIMAL POINT AND DIVIDING

1. $9\overline{)72}$	2. $9\overline{)7.2}$	3. $9\overline{).72}$	4. $.9\overline{)72}$
5. $.7\overline{)7.2}$	6. $6\overline{).54}$	7. $9\overline{).45}$	8. $.09\overline{).45}$

9. $3\overline{)29}$ Carry the quotient to three decimal places.

10. Change $6\frac{3}{4}$ to a mixed decimal.

TABLES OF MEASURES

LENGTH

12 inches (in.) (″)	=	1 foot (ft.) (′)
3 feet	=	1 yard (yd.)
$5\frac{1}{2}$ yd. or $16\frac{1}{2}$ ft.	=	1 rod (rd.)
320 rods or 5280 ft.	=	1 mile (mi.)

SURFACE

144 square inches (sq. in.)	=	1 square foot (sq. ft.)
9 square feet	=	1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards	=	1 square rod (sq. rd.)
160 square rods	=	1 acre (A.)
640 acres	=	1 square mile (sq. mi.)

CUBIC

1728 cubic inches (cu. in.)	=	1 cubic foot (cu. ft.)
27 cubic feet	=	1 cubic yard (cu. yd.)

WEIGHT

16 ounces (oz.)	=	1 pound (lb.)
100 pounds	=	1 hundredweight (cwt.)
2000 pounds	=	1 ton (T.)

LIQUID

2 pints (pt.)	=	1 quart (qt.)
4 quarts	=	1 gallon (gal.)

DRY

2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks or 32 quarts	= 1 bushel (bu.)

TIME

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
52 weeks or 365 days	= 1 year (yr.)
or 366 days	= 1 leap year
12 months (mo.)	= 1 year
100 years	= 1 century

COUNTING

12 units	= 1 dozen (doz.)
12 dozen	= 1 gross (gro.)

INTERESTING FACTS ABOUT MEASURES

1 pt. of water = about 1 lb.
4 cups of flour = 1 lb.
1 bbl. of flour = 196 lb.
1 gal. = 231 cu. in.
1 T. of hard coal = 35 cu. ft.
1 T. of soft coal = 42 cu. ft.
1 cu. ft. of water weighs $62\frac{1}{2}$ lb.
1 bu. = $1\frac{1}{4}$ cu. ft. or 2150 cu. in.
1 cd. (cord) of wood = 128 cu. ft.

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